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Risk Assessment Methodology for Software Supportability (RAMSS): Guidelines for Adapting Software Supportability Evaluations

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April 14, 1986

BDM/ABQ-86-0090-TR

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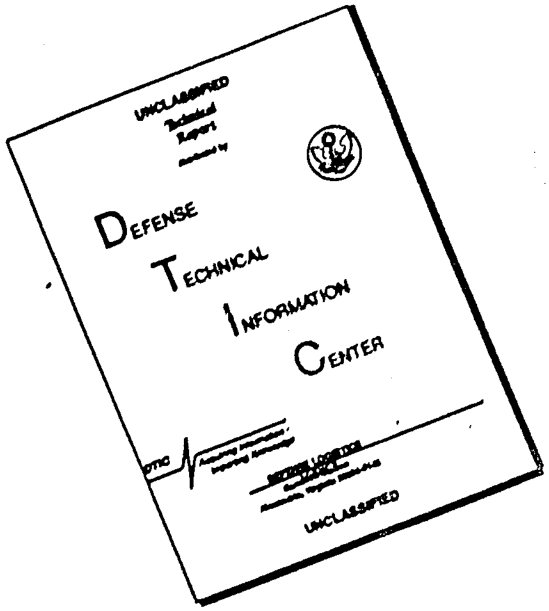

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FOREWORD

a. This technical report, BDM/ABQ-86-0090-TR, is submitted by The BDM Corporation, 1801 Randolph Road SE, Albuquerque, New Mexico 87106 to the Air Force Operational Test and Evaluation Center, Kirtland Air Force Base, Albuquerque, New Mexico 87117-7001. This submission is in compliance with the requirements of paragraph 7.2 of Subtask Statement 412/1, titled "Software Supportability Risk Assessment: Pilot Application."

b. This report is the result of effort by Dr. David Peercy (Technical Leader) and Mr. Walter Huebner, Jr. (Task Leader), of The BDM Corporation. The primary Subtask Statement Project Officer is Capt. Eric H. Tomlin (AFOTEC/LG5T); the alternate Subtask Statement Project Officer is Maj. Gary R. Horlbeck (AFOTEC/LG5T).

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RISK ASSESSMENT METHODOLOGY FOR SOFTWARE SUPPORTABILITY (RAMSS): GUIDELINES FOR ADAPTING SOFTWARE SUPPORTABILITY EVALUATIONS

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SECURITY CLASSIFICATION OF THIS PAGE

AD-A190 286

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS: N/A
2a. SECURITY CLASSIFICATION AUTHORITY: N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT: Unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): BDM/ABQ-86-0090-TR	5. MONITORING ORGANIZATION REPORT NUMBER(S): N/A
6a. NAME OF PERFORMING ORGANIZATION: THE BDM CORPORATION; 6b. OFFICE SYMBOL (If applicable):	7a. NAME OF MONITORING ORGANIZATION: Air Force Operational Test and Evaluation Center
6c. ADDRESS (City, State and ZIP Code): 1801 Randolph RD SE, Albuquerque, New Mexico 87106	7b. ADDRESS (City, State and ZIP Code): Kirtland Air Force Base, New Mexico 87117-7001
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: Sams as 7a; 8b. OFFICE SYMBOL (If applicable): RMC	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: F29601-85-C-0058
8c. ADDRESS (City, State and ZIP Code): Same as 7b	10. SOURCE OF FUNDING NOS.

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT NO.
SS 412/01		7.2	

11. TITLE (Include Security Classification): Risk Assessment Methodology for Software...

12. PERSONAL AUTHOR(S): D. E. Peercy, W. F. Huebner

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Yr., Mo., Day)	15. PAGE COUNT
Technical	FROM 10/24/85 TO 4/14/86	1986 April 14	300

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB. GR.	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The Risk Assessment Methodology for Software Supportability (RAMSS) was developed for the Air Force Operational Test and Evaluation Center (AFOTEC) to provide decision makers with information from which the risk to the Air Force of supporting a software system can be derived. The purpose of this Guidelines report is to document procedures which adapt the current AFOTEC software test methodologies for use by the RAMSS. In particular, the procedures address the RAMSS concept of a user/supporter baseline estimate, and expand upon the application of the software life cycle process evaluation.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☒ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE NUMBER (Include Area Code)	22c. OFFICE SYMBOL
Captain Eric H. Tomlin	505-846-1381	AFOTEC/LG5T

DD FORM 1473, 83 APR   EDITION OF 1 JAN 73 IS OBSOLETE.   Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

Item 11 (cont'd): Supportability (RAMSS): Guidelines for Adapting Software Supportability Evaluations

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

I. Introduction

SECTION I

INTRODUCTION

1.1 PURPOSE OF GUIDELINES.

The purposes of the guidelines presented in this report are to:

(1) Document the procedures necessary to adapt the current Air Force Operational Test and Evaluation Center (AFOTEC) software supportability test methodologies to the concepts of risk assessment (see section 1.4 for appropriate references)

(2) Document the procedures required to perform a Software Life Cycle Process (SCLP) supportability evaluation, thereby establishing a third tool available to AFOTEC for use in evaluating software supportability (see figure 1-1).

1.2 OVERVIEW OF RISK ASSESSMENT.

a. AFOTEC has the responsibility for conducting operational test and evaluation (OT&E) of assets entering the Air Force inventory. AFOTEC has developed and implemented various software OT&E methodologies. Two of these methods, Software Product maintainability evaluation and Software Support Resources evaluation, are shown in figure 1-1 to illustrate how they relate to the overall evaluation of software supportability. Over the past several years, these two methods have matured and have become the Air Force standard for evaluating, software supportability. Each of these developed methods evaluates specific characteristics of the supportability aspects of delivered software products and software support resources. These

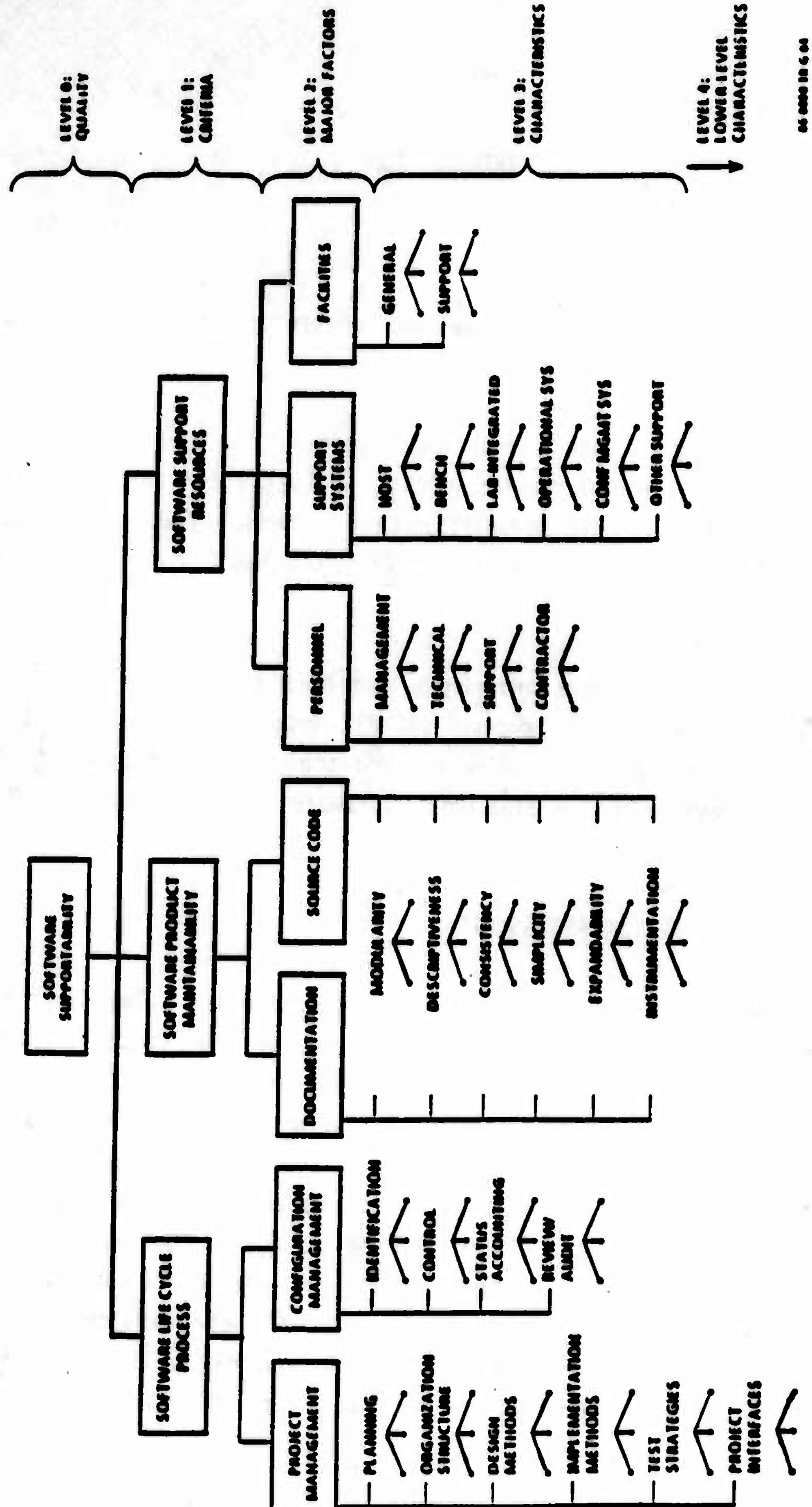

Figure 1-1. Elements of Software Supportability Evaluations

stand-alone evaluations provide AFOTEC with information to identify particular software supportability deficiencies, but do not identify overall risk associated with contractor or military ownership and organic maintenance of contractor-delivered software.

b. AFOTEC's concern about the need of a risk assessment method which provides software testers with areas which require testing emphasis, and decision makers with an assessment of the software supportability risk, has resulted in the development of the Risk Assessment Methodology for Software Supportability (RAMSS). This methodology uses the Software Product and Software Support Resources evaluations mentioned above, in addition to a third method (documented in this report) called a Software Life Cycle Process (SCLP) evaluation, to produce an overall software supportability risk. The following paragraphs discuss the evolution and general application of the risk assessment process.

1.2.1 <u>Concept Development</u>.

a. Since 1982, AFOTEC has been analyzing the problem of how to assess the risk to the Air Force of supporting software acquired for weapon systems. A concept for computer resources risk assessment during operational test and evaluation was proposed in 1983 (reference 1.4.16). Several issues evolved from this proposal. First, the assessed risk should reflect software supportability impact upon the system at a level appropriate for AFOTEC reporting requirements. Second, supportability is a concern for both the user and the supporter. Any defined risk of software supportability should reflect some aspect of user risk and supporter risk. Third, current AFOTEC methods of evaluating software supportability should be integrated into the risk assessment method. Also, the risk assessment method should be adaptable to include other AFOTEC concerns such as software maturity and software reliability.

b. This initial concept proposal provided AFOTEC with justification to study the feasibility of developing and implementing a risk assessment methodology for software supportability (RAMSS). The approach for this study (references 1.4.2, 1.4.3, 1.4.4) included:

(1) Literature review and assemblage of a data base of relevant tools, techniques and methods

(2) Analysis of relevant tools, techniques, and methods for feasibility of application to AFOTEC's needs

(3) Development of a framework for assessing software supportability risk along with a preliminary set of risk measures.

c. The primary conclusion from this feasibility study was that a RAMSS could be developed based upon the framework derived as part of the study. However, there were still several technical issues which needed to be resolved. Of these issues, the major one concerned the need to establish a baseline against which to measure risk. Since risk was defined (for this study) as "the potential for realization of unwanted, negative consequences of an event," it was necessary to have a baseline of software support activities in order to tell when a consequence may be negative. This baseline, called an historical maintenance profile, reflects how software support resources are being used to perform the software support activities. Given this information, the framework recommended by the feasibility study could be used to compute measures of risk and incorporate the issues proposed in 1983.

1.2.2 Methodology Requirements (Inputs). Figure 1-2 illustrates interfaces with the RAMSS. The inputs consist of:

(1) The historical profile of software maintenance activity

(2) A user/supporter estimate on planned software maintenance changes and support resource requirements for the software system being evaluated

(3) An evaluation of software support capabilities using current AFOTEC methods.

1.2.3 Methodology Analysis. The RAMSS inputs are combined and analyzed, and measures of risk computed for the system being evaluated.

1.2.4 Methodology Benefits (Results).

a. The major results of the RAMSS are also illustrated in figure 1-1. These results include:

(1) The software supportability risk measure which quantifies the probability of the user/supporter baseline estimate not being accomplished with current software support capabilities

(2) The capability to identify the impact of the software supportability risk as high, medium, or low

(3) The identification of the drivers of the software supportability risk

(4) The projection of alternative choices for risk reduction (for instance, by improving certain aspects of current or projected software support capabilities).

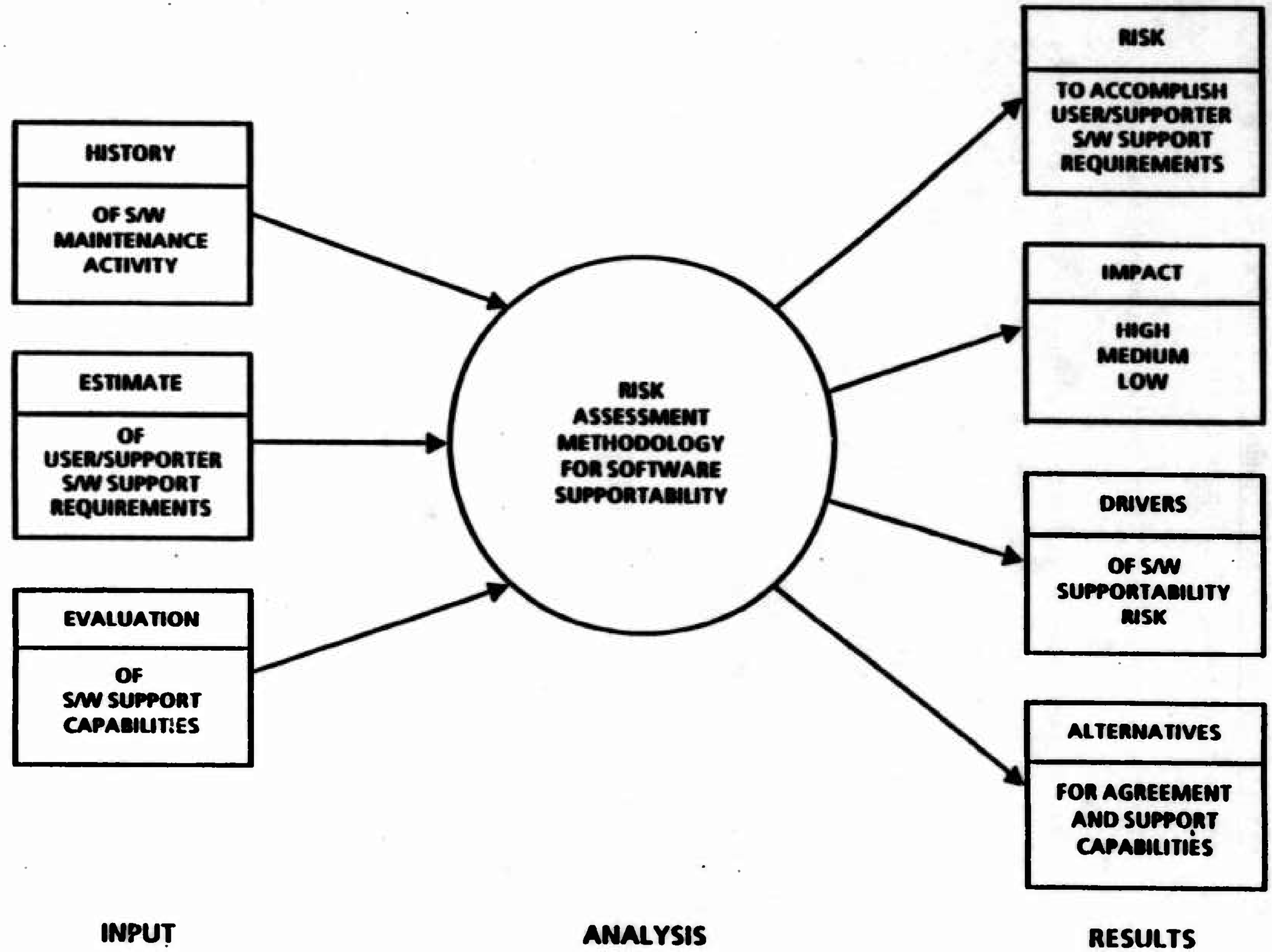

Figure 1-2. High Level View of Risk Assessment Methodology for Software Supportability

b. With this information, the decision maker can assess the effect of software supportability upon system suitability and effectiveness. In addition, detailed data are available to help answer specific questions such as why particular areas of software supportability are drivers and how the measured risk can be reduced to an acceptable level.

1.2.5 Baseline Definition and Application.

a. As discussed above, a key element to the risk assessment process is recognition that software supportability is important both to the user and to the supporter of the software. Therefore any risk assessment methodology which ignores the interests of one of these parties may estimate a risk that is unacceptable to the other. In an attempt to bridge this gap, the RAMSS input requires a User/Supporter Baseline Estimate be established, and that the evaluations of software support capabilities be made against that Baseline.

b. The User/Supporter Baseline Estimate uses inputs from both the user (using command) and the supporter (supporting command). The estimate includes an understanding of the software block release cycle, projected software support personnel (numbers and types), and anticipated software change request activity for each block release. Details of the User/Supporter Baseline Estimate are contained in section VI of this report.

c. The current AFOTEC methods for evaluating software supportability do not consider in a direct manner the effect of an estimated baseline. The establishment of an estimated baseline is critical to risk assessment because it (1) provides a means to judge how well the measured risk agrees with the estimated risk (which is, in some sense, "acceptable" to both the user and the supporter), and (2) quantifies the options required to lower the measured and acceptable risks (a desired result of the risk assessment process).

This report documents what steps should be taken during the evaluation of a system's software supportability to ensure that the User/Supporter Baseline Estimate is accounted for in the risk assessment process.

1.3 GENERAL ORGANIZATION OF GUIDELINES.

The remainder of this report is organized into five additional sections, plus an appendix that contains materials necessary to use the software life cycle process method (tool) with the RAMSS. Report sections satisfy the following objectives:

(1) Section II gives an overview of the adaptation guidelines recommended by this report

(2) Section III contains a discussion of the adaptation of the Software Product evaluation method

(3) Section IV contains a discussion of the adaptation of the Software Support Resources evaluation method

(4) Section V introduces and describes a method to evaluate the Software Life Cycle Process for characteristics of software supportability

(5) Section VI provides details on obtaining a User/Supporter Baseline Estimate

(6) Appendix A is an Evaluator's Guide to the performance of the Software Life Cycle Process (SCLP) evaluation method.

1.4 REFERENCES.

The following documents are referenced by this report:

(1) 1.4.1 "Software Supportability Risk Assessment: Pilot Application," subtask Statement 412 for AFOTEC Contract F29601-85-C-0058, AFOTEC, Kirtland AFB, NM, October 1985

(2) 1.4.2 Hoessel, W., W. Huebner, D. Peercy, G. Richardson, "Software Supportability Risk Assessment in OT&E: Literature Review, Current Research Review, and Data Base Assemblage," BDM/A-84-0322-TR (Final), September 1984

(3) 1.4.3 Huebner, W., D. Peercy, G. Richardson, "Software Supportability Risk Assessment in OT&E: An Evaluation of Risk Methodologies," BDM/A-84-0496-TR (Final), August 1984

(4) 1.4.4 Huebner W., D. Peercy, G. Richardson, "Software Supportability Risk Assessment in OT&E: Measures for a Risk Assessment Model," BDM/A-84-0565-TR (Final), September 1984

(5) 1.4.5 Peercy, D., W. Huebner, M. Estill, J. Wu, "Software Supportability Risk Assessment in OT&E: Historical Baselines for Risk Profiles," BDM/A-85-0510-TR (Vols I and II), October 1985

(6) 1.4.6 Peercy, D., M. Estill, W. Huebner, K. Shaw, J. Wu, "Risk Assessment Methodology for Software Supportability (RAMSS) User's Handbook," BDM/ABQ-85-1270-TR, April 1986

(7) 1.4.7 Peercy, D., W. Huebner, M. Estill, K. Shaw, "Risk Assessment Methodology for Software Supportability

(RAMSS): Pilot Evaluation Results and Methodology Refinement," BDM/ABQ-86-0360-TR, April 1986.

(8) 1.4.8 AFOTECP 800-2 Volumes I through V Software OT&E Guidelines. (Volume V is no longer being published)

(9) 1.4.9 dBASE III User Manual, Ashton Tate, Culver City, CA, 1984

(10) 1.4.10 BMDPC: User's Guide to BMDP on the IBM PC, BMDP Statistical Software, Inc., Los Angeles, CA, (no date)

(11) 1.4.11 ANSI/MIL-STD-1815A-1983, Reference Manual for the Ada Programming Language, January 22, 1983

(12) 1.4.12 DOD-STD-2167, Defense System Software Development, June 4, 1985

(13) 1.4.13 Software Technology for Adaptable, Reliable Systems (STARS), Program Strategy, Department of Defense, March 15, 1983

(14) 1.4.14 DoDD 5000.3, Test and Evaluation, Draft, December 26, 1985

(15) 1.4.15 DoD 5000.3 M-3, Software Test and Evaluation Manual, Draft Volume 1, OUSDR&E (DDT&E), October 1985

(16) 1.4.16 Fisk, F., and W. Murch, "A Proposal for Computer Resources Risk Assessment During Operational Test and Evaluation," AFOTEC Draft Report, October 3, 1983.

1.5 TERMS AND ABBREVIATIONS.

AF	Air Force
AFB	Air Force Base
AFOTEC	Air Force Operational Test and Evaluation Center
AISF	Avionics Integration Support Facility
ALC	Air Logistics Center
ASSET	AFOTEC Software Support Evaluation Tool
BMDP	BMDP Statistical Software (NOTE: BMDP is a name, not an acronym.)
C-E	Communications-Electronics
CDR	Critical Design Review
CRISP	Computer Resources Integrated Support Plan
CRLCMP	Computer Resources Life Cycle Management Plan
CRWG	Computer Resources Working Group
DoD	Department of Defense
DSE	Deputy for Software Evaluation
DT&E	Development Test and Evaluation
ECS	Embedded Computer System
FCA	Functional Configuration Audit
HQ-TAC	Headquarters Tactical Air Command
IV&V	Independent Verification and Validation
JTIDS	Joint Tactical Information Distribution System
O/S CMP	Operational/Support Configuration Management Procedures
OT&E	Operational Test and Evaluation
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PMD	Program Management Directive
PMP	Program Management Plan
PMPC	Person Months Per Change
PMRT	Program Management Responsibility Transfer
RA	Risk Assessment
RAMSS	Risk Assessment Methodology for Software Supportability
RFP	Request for Proposal

SLCP	Software Life Cycle Process
SON	Statement of Need
S/W	Software
SS	Software Supportability
SS	Software Support
SSR	Software Specification Review
SSR	Software Support Resources
STM	Software Test Manager
TEMP	Test and Evaluation Master Plan
TRR	Test Readiness Review
WR-ALC	Warner Robins Air Logistics Center

II. Overview of Adaptation Guidelines

SECTION II

OVERVIEW OF ADAPTATION GUIDELINES

2.1 INTRODUCTION.

a. The guidelines for adapting the AFOTEC Software Supportability Evaluation to the requirements of the RAMSS focus on two primary aspects. First, the current evaluations of software product and software support resources characteristics should be appropriately updated. In particular, the User/Supporter Baseline Estimate should be integrated into the evaluation procedure. Second, the Software Life Cycle Process (SLCP) evaluation should be conducted to provide proper evaluation depth in the areas of software project management and software configuration management. The software supportability evaluation hierarchy is shown in figure 1-1 of section I.

b. The current AFOTEC procedures for software supportability evaluations (reference 1.4.8) were reviewed. A summary of the resulting adaptation guidelines is presented in sections 2.2 and 2.3. A summary of the recommended guidelines for adding the SLCP evaluation to AFOTEC's evaluation procedures is presented in section 2.4. A summary of the recommended guidelines for derivation and integration of the User/Supporter Baseline Estimate is presented in section 2.5. Appropriate details of these guidelines are presented in sections III, IV, V, VI and appendix A. The major guidelines are summarized in figure 2-1.

2.2 SOFTWARE PRODUCT EVALUATION.

a. A review of current AFOTEC evaluation for software product supportability characteristics (see Volume III of reference 1.4.8) indicated there were no significant changes necessary to integrate with the RAMSS. The User/Supporter Baseline Estimate should

minimally affect the conduct of or evaluation results for the software product evaluation. The current guidelines for conduct of the evaluation appear to be adequate, except that the User/Supporter Baseline Estimate should be discussed during the evaluator calibration step.

EVALUATION	GUIDELINES	ADDITIONAL/NEW MATERIALS
1. SOFTWARE PRODUCT	1. MINIMAL USE OF USER/SUPPORTER BASELINE ESTIMATE NECESSARY. 2. ADD STEP TO EVALUATION ANALYSIS TO ENTER EVALUATION SCORES FOR CHARACTERISTICS AT LEVEL 3 OF THE HIERARCHY TO THE RAMSS EVALUATION DATA BASE.	1. UPDATED HIERARCHY FIGURE FOR OVERALL SOFTWARE SUPPORTABILITY EVALUATION 2. USER/SUPPORTER BASELINE ESTIMATE
2. SOFTWARE SUPPORT RESOURCES	1. USE USER/SUPPORTER BASELINE ESTIMATE AS AN AID TO UNDERSTANDING SOFTWARE SUPPORT RESOURCE REQUIREMENTS. DISCUSS ESTIMATE DURING EVALUATOR ORIENTATION/CALIBRATION. 2. ADD STEP TO EVALUATION ANALYSIS TO ENTER EVALUATION SCORES FOR CHARACTERISTICS AT LEVEL 3 OF THE HIERARCHY TO THE RAMSS EVALUATION DATA BASE.	1. UPDATED HIERARCHY FIGURE 2. USER/SUPPORTER BASELINE ESTIMATE
3. SOFTWARE LIFE CYCLE PROCESS	1. DEVELOP AND USE USER/SUPPORTER BASELINE ESTIMATE AS AN AID TO UNDERSTANDING THE EXTENT OF PROJECT AND CONFIGURATION MANAGEMENT REQUIREMENTS DURING SUPPORT. 2. COLLECT INFORMATION NECESSARY TO EVALUATE CHARACTERISTICS AS NORMAL PART OF SOFTWARE PROGRAM PROCUREMENT, DEVELOPMENT/CONTRACTOR, AND OTHER OT&E INTERFACE ACTIVITIES. 3. ORGANIZE SOFTWARE LIFE CYCLE PROCESS EVALUATION SUPPORT INFORMATION IN A PROJECT (STM/OSE) NOTEBOOK. 4. CONDUCT EVALUATION ACCORDING TO STEPS DESCRIBED IN APPENDIX C.	1. APPENDIX A 2. USER/SUPPORTER BASELINE ESTIMATE

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Figure 2-1. Summary of Adaptation Guidelines

b. One minor additional step is required in the software product evaluation procedure. When the evaluation is complete, the evaluation results required by the RAMSS must be computed and entered into the RAMSS data base through procedures described in the RAMSS User's Handbook (reference 1.4.6). The current automated tools which

support this evaluation provide the necessary computation and report capability. The evaluation results required include:

(1) Software Documentation
   a) Modularity Rating
   b) Descriptiveness Rating
   c) Consistency Rating
   d) Simplicity Rating
   e) Expandability Rating
   f) Instrumentation Rating

(2) Software Source Code
   a) Modularity Rating
   b) Descriptiveness Rating
   c) Consistency Rating
   d) Simplicity Rating
   e) Expandability Rating
   f) Instrumentation Rating

Evaluation scores are in the real range from 1.0 to 6.0.

2.3 SOFTWARE SUPPORT RESOURCES EVALUATION.

A review of the current AFOTEC evaluation for Software Support Resources (SSR) supportability characteristics resulted in the following recommended guidelines:

(1) It appears that the current automated tools (ASSET) are not being as effectively utilized as possible. The RAMSS depends upon the capability of AFOTEC to obtain evaluation ratings at the appropriate hierarchy level. This level is reflected in the hierarchy as supported by the ASSET evaluation tools. However, since RAMSS only depends upon the availability of the corresponding

evaluation ratings, not how they were obtained (e.g., from lower level, ASSET-based questionnaires) the use of ASSET is not directly required to obtain a valid risk assessment using the RAMSS. However, AFOTEC personnel need a more effective use of the concepts and contents of Volume V (see reference 1.4.8) or a more effective reorientation to Volume V in order to properly utilize the ASSET capabilities.

(2) The User/Supporter Baseline Estimate is useful, and should be incorporated into the SSR evaluation during the early evaluation orientation and discussion. The main use of the estimate appears to be in facilitating necessary discussion on resource (personnel, systems, facilities) requirements. This results in better planning for actual resource requirements which become part of the SSR evaluation discussion.

(3) Another minor additional step is required in the SSR evaluation procedure. When the evaluation is complete, the evaluation results required by the RAMSS must be computed and entered into the RAMSS data base through procedures described in the RAMSS User's Handbook (reference 1.4.6). The current ASSET automated tools which support this evaluation provide adequate computation and report capability. The evaluation results required include:

a) <u>Personnel/Resources</u>
   Management Rating
   Technical Rating
   Support/Clerical Rating
   Contractor Rating

b) <u>Support Systems Resources</u>
Host Processors Rating
Software Bench(es) Rating
Laboratory-Integrated Test Facilities Rating
Operational-Integrated Test Facilities Rating
Configuration Management System Rating
Other Support Systems Rating

c) <u>Physical Facilities Resources</u>
General Office/Storage Facilities Rating
Support Systems Facilities Rating

Evaluation scores are in the real range from 1.0 to 6.0.

2.4 SOFTWARE LIFE CYCLE PROCESS EVALUATION.

a. The Software Life Cycle Process (SLCP) evaluation is recommended in references 1.4.4 and 1.4.5 to supplement the current AFOTEC software supportability evaluation. The SLCP evaluation focuses upon the project management and configuration management processes across the software life cycle. It is recommended that AFOTEC adopt the SLCP evaluation procedures as described in section V and appendix A. The format of appendix A was chosen to facilitate adoption of the SLCP as an AFOTEC 800-2 pamphlet.

b. In the process of obtaining information for the SLCP evaluation, the Software Test Manager (STM)/Deputy for Software Evaluation (DSE) should establish one or more versions of the User/Supporter Baseline Estimate. The SLCP evaluation can utilize the User/Supporter Baseline Estimate as an aid to assessing whether the support activity can actually accomplish proper project and configuration management in light of the procurement and contractor project and configuration management practices. Project management characteristics of evaluation include planning, organization structure,

design methods, implementation methods, test strategies and organization interfaces. Configuration management characteristics of evaluation include configuration identification, configuration control, status accounting, and audit review. Each of the characteristics is evaluated relative to the life cycle activities of procurement, contractor/development, and operational/support.

c. It is recommended that the AFOTEC STM and/or DSE be responsible for the conduct of the SLCP evaluation. Information to help the overall assessment can be gathered from many sources over the life of OT&E involvement with a system evaluation. The Test and Evaluation Master Plan (TEMP), Computer Resources Integrated Support Plan (CRISP), Operational/Support Configuration Management Procedures (O/S CMP), the Computer Resources Working Group (CRWG), and the many interface meetings and program reviews attended by STM/DSE or representatives are useful sources of life cycle information. The SLCP evaluation could be completed by a set of evaluators designated by the STM/DSE, or by the STM/DSE with the help of the collected data and other expert personnel. The information collected by the STM/DSE should be entered into a STM/DSE software OT&E notebook containing the SLCP questions for frequent reference and use during life cycle planning meetings involving OT&E software personnel (e.g., the STM/DSE).

d. The results of the SLCP evaluation should be entered into the RAMSS evaluation data base at least for the characteristics required by the RAMSS, and at the lower levels if so desired. The minimum data required includes:

(1) Project Management
  a) Planning Rating
  b) Organizational Structure Rating
  c) Design Methods Rating
  d) Implementation/Coding Methods Rating

e) Test Strategies Rating
f) Project Interfaces Rating

(2) Configuration Management
a) Identification Rating
b) Control Rating
c) Status Accounting Rating
d) Audit/Review Rating

Evaluation scores are in the real range from 1.0 to 6.0.

2.5 USER/SUPPORTER BASELINE ESTIMATE.

a. The User/Supporter Baseline Estimate is derived from interaction among AFOTEC, Using Command, and Supporting Command personnel. The RAMSS automated support tools can be used to assist in deriving a draft Estimate from historical data. The Estimate should be obtainable through normal program OT&E planning and evaluation functions, perhaps augmented by one or two short site visits and telephone contacts. The resulting Estimate consists of the following information:

(1) System Identification Data: names of the system, software, using and supporting commands

(2) Software Support Concept: block release duration and overlap, and personnel requirements

(3) Baseline Change Profile: change request totals for up to three block releases by type, complexity and priority.

b. The User/Supporter Baseline Estimate may not be extensively used in the Software Product evaluation, the Software Support Resources evaluation and the Software Life Cycle Process evaluation.

III. Software Product Evaluation

SECTION III

SOFTWARE PRODUCT EVALUATION GUIDELINES

3.1 INTRODUCTION.

a. The software product evaluation has a top level hierarchy as shown in figure 3-1 (volume III, reference 1.4.8). This top level hierarchy corresponds to the level of evaluation required by the RAMSS (reference 1.4.5). In particular, evaluation results at level 3 of the hierarchy are required for input to the RAMSS evaluation data base. The RAMSS does not require any other specific assumptions of the software product evaluation.

b. Of the evaluation methodologies used by AFOTEC, the RAMSS probably has the least effect on the software product evaluation. After examining the questions used during the software product evaluation, it seemed that the level of responses were in general too detailed to be influenced by the User/Supporter Baseline Estimate. For example, many questions require forced responses based upon the software development techniques used (i.e., language type, existence of preface block information, top down structured programming) which are independent of the User/Supporter Baseline Estimate of software support requirements. The responses to some questions in the Instrumentation category may be influenced by the evaluator's knowledge of a high or low risk from the User/Supporter Baseline Estimate; however, it is not possible to make a direct correlation between the questions and the estimate. The primary value to understanding the User/Supporter Baseline Estimate in the software product evaluation process is the additional system knowledge provided to the evaluators that may point to specific problems and/or areas which require special attention.

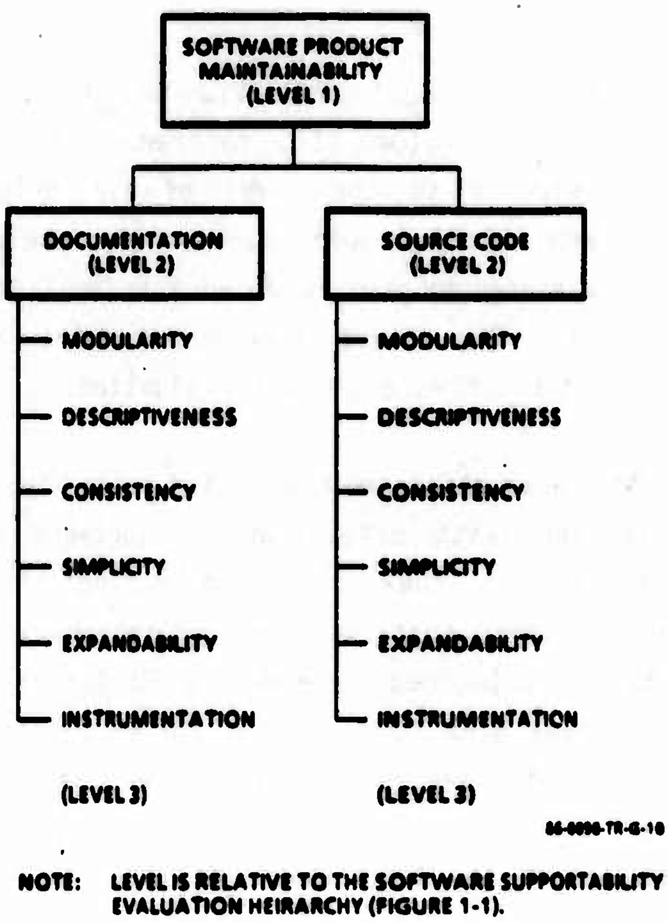


Figure 3-1. Software Product Maintainability Evaluation Heirarchy

3.2 REQUIREMENTS.

The adaptation of the software product evaluation to accommodate the RAMSS requirements is subject to several constraints and/or requirements listed below.

(1) Requirement 1: The software product hierarchy of evaluation criteria must agree with the hierarchy as presented in figure 3-1 through level 3. Each characteristic (level 3) shall be measured on the standard AFOTEC scale which allows for real valued responses from 1.0 to 6.0.

(2) Requirement 2: The current procedures for evaluating the software product characteristics must not be significantly impacted by the RAMSS requirements. The only modifications to the current evaluation procedures include the use of the User/Supporter Baseline Estimate as an estimate of the post deployment software support block release schedule, personnel requirements, and level of change activity.

(3) Requirement 3: Evaluation results must be entered into the RAMSS evaluation data base using the automated support tools described in the RAMSS User's Handbook (reference 1.4.6). The evaluation results correspond to the level 3 characteristics of figure 3-1.

3.3 GUIDELINES.

The guidelines for adapting the software product evaluation for the RAMSS are organized into the following subsections: Software Product Evaluation Procedure, Software Product Evaluation Materials, and Software Product and RAMSS Interface.

3.3.1 Software Product Evaluation Procedures. The Evaluation Procedure consists of the following four distinct phases:

(1) Phase I - plan for the evaluation

(2) Phase II - calibrate the evaluators

(3) Phase III - evaluate the software product maintainability

(4) Phase IV- analyze and assess the results.

Each of the phases is modified to include RAMSS considerations in the following way:

(1) Phase I - STM/DSE assure that a credible User/Supporter Baseline Estimate is available. If not, plan to obtain a draft version based upon historical data using the RAMSS automatic support tools. Iterate the draft version among Using Command and Supporting Command personnel until there is a reasonable agreement of the estimated software support baseline. See section VI for more details on the baseline.

(2) Phase II - the User/Supporter Baseline Estimate is explained to the evaluators during the calibration briefing for the software product evaluation. Actual Estimate data probably has only a minor direct effect of providing additional system knowledge during the calibration and eventual evaluation. Most of the value is from communication and discussion resulting from derivation of the Estimate.

(3) Phase III - no specific RAMSS impact during this phase.

(4) Phase IV - the results of the software product evaluation for the level 3 characteristics are entered into the RAMSS evaluation data base for subsequent risk analysis.

3.3.2 Evaluation Materials. The only additional materials required for the software product evaluation are the User/Supporter Baseline Estimate and a current software supportability hierarchy diagram (to level 3 characteristics).

3.3.3 Software Product and RAMSS Interface.

a. The following twelve software product characteristic evaluation scores, in the real range of 1.0 to 6.0, must be entered into the RAMSS evaluation data base (reference 1.4.6):

(1) Documentation
Modularity Rating
Descriptiveness Rating
Consistency Rating
Simplicity Rating
Expandability Rating
Instrumentation Rating

(2) Source Code
Modularity Rating
Descriptiveness Rating
Consistency Rating
Simplicity Rating
Expandability Rating
Instrumentation Rating

b. The RAMSS data base should contain the User/Supporter Baseline Estimate. A printed report can be obtained for use during the Software Product evaluation (reference 1.4.6).

IV. Software Support Resources Evaluation

SECTION IV

SOFTWARE SUPPORT RESOURCES EVALUATION GUIDELINES

4.1 INTRODUCTION.

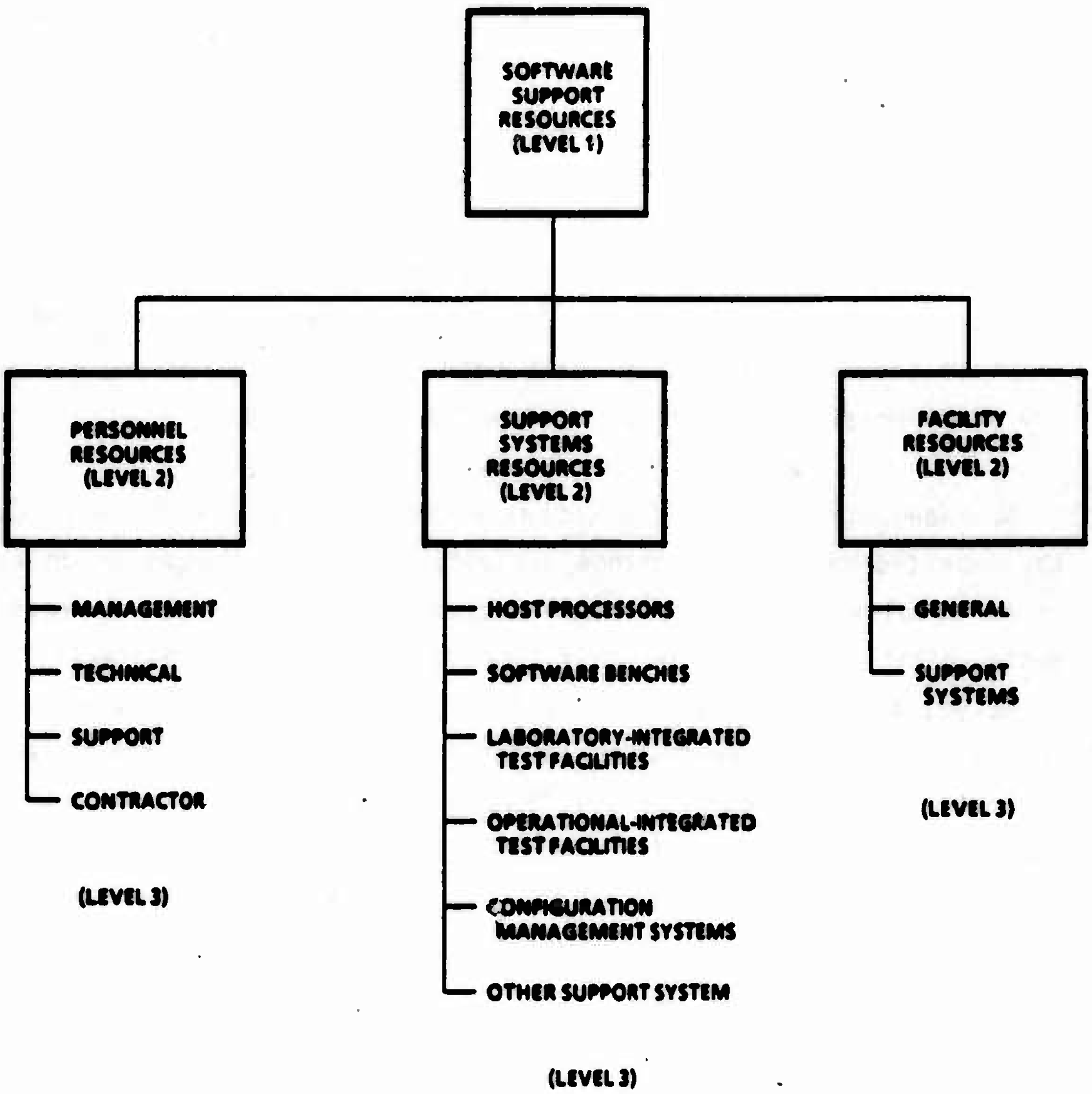
a. The Software Support Resources (SSR) evaluation has a top level hierarchy as shown in figure 4-1 (reference 1.4.8, volume V). This top level hierarchy corresponds to the level of evaluation results required by the RAMSS (reference 1.4.5). In particular, evaluation results at the level 3 of the hierarchy are required for input to the RAMSS evaluation data base. The RAMSS does not require any other specific assumptions of the SSR evaluation.

b. Adequate planning for software support resources depends upon the expected maintenance change activity. If many changes which tend to be complex enhancements are expected, then the resource requirements might be extensive. If few changes of low complexity are expected, then resource requirements might be minimal. The required schedule for releasing changes to the field also affects the software support resource requirements. These concepts are part of the User/Supporter Baseline Estimate. This Estimate is used during the software supportability evaluation orientation/calibration of the evaluators.

4.2 REQUIREMENTS.

The adaptation of the SSR evaluation to accommodate the RAMSS requirements is subject to several constraints and/or requirements listed below.

(1) Requirement 1: The SSR hierarchy of evaluation criteria must agree with the hierarchy as presented in figure 4-1



NOTE: LEVEL IS RELATIVE TO THE SOFTWARE SUPPORTABILITY EVALUATION HIERARCHY (FIGURE 1-1)

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Figure 4-1. Software Support Resources Evaluation Hierarchy

through level 3. Each characteristic (level 3) shall be measured on the standard AFOTEC scale which allows for real valued scores from 1.0 to 6.0.

(2) Requirement 2: The current procedures for evaluating the SSR characteristics must not be significantly impacted by the RAMSS requirements. The only modifications to the current evaluation procedures include the use of the User/Supporter Baseline Estimate as an estimate of the post deployment software support block release schedule, personnel requirements and level of change activity.

(3) Requirement 3: Evaluation results must be entered into the RAMSS evaluation data base using the automated support tools described in the RAMSS User's Handbook (reference 1.4.6). The evaluation results correspond to the level 3 characteristics of figure 4-1.

4.3 GUIDELINES.

The guidelines for adapting the SSR evaluation for the RAMSS are organized into the following subsections: SSR Evaluation Procedure, SSR Evaluation Materials, SSR and RAMSS Interface.

4.3.1 SSR Evaluation Procedure. The SSR Evaluation Procedure consists of the following four phases.

(1) Phase I - plan for the SSR evaluation

(2) Phase II - generate the SSR evaluation questionnaire

(3) Phase III - evaluate the capability of the SSR to satisfy each support requirement

(4) Phase IV - combine the evaluation results into an overall assessment.

Each of the phases is modified to include RAMSS considerations in the following way:

(1) Phase I - STM/DSE assure that a credible User/Supporter Baseline Estimate is available. If not, plan to obtain a draft version based upon historical data using the RAMSS automatic support tools. Iterate the draft version among Using Command and Supporting Command personnel until there is a reasonable agreement of the estimated software support baseline. See section VI for more details on the baseline.

(2) Phase II - no specific RAMSS impact during this phase.

(3) Phase III - the User/Supporter Baseline Estimate is explained to the evaluators prior to conduct of the SSR evaluation. Most of the benefit is from communication and discussion during derivation of the Estimate. Actual estimate data probably have only a minor direct effect of providing additional system knowledge during evaluation.

(4) Phase IV - the results of the SSR evaluation for the level 3 characteristics are entered into the RAMSS evaluation data base for subsequent risk analysis.

4.3.2 <u>SSR Evaluation Materials</u>. The only additional materials required for the SSR evaluation are the User/Supporter Baseline Estimate and a current software supportability hierarchy diagram (to level 3 characteristics).

4.3.3 SSR and RAMSS Interface.

a. The following twelve SSR characteristic evaluation scores, in the real range of 1.0 to 6.0, must be entered into the RAMSS evaluation data base (reference 1.4.6):

(1) Personnel Resources
Management Rating
Technical Rating
Support/Clerical Rating
Contractor Rating

(2) Support Systems Resources
Host Processors Rating
Software Bench(es) Rating
Laboratory-Integrated Test Facilities Rating
Operational-Integrated Test Facilities Rating
Configuration Management System(s) Rating
Other Support System(s) Rating

(3) Physical Facility Resources
General Office/Storage Facilities Rating
Support Systems Physical Facilities Rating

b. Some of the twelve characteristics may not be evaluated (e.g., contractor personnel, other support systems) because they are not applicable. In other cases, it may be that two or more of the support systems are the same, in which case only one score would be computed.

c. The RAMSS data base should contain the User/Supporter Baseline Estimate. A printed report can be obtained for use during the SSR evaluation (reference 1.4.6).

V. Software Life Cycle Process Evaluation

SECTION V

SOFTWARE LIFE CYCLE PROCESS EVALUATION GUIDELINES

5.1 INTRODUCTION.

a. Since AFOTEC does not currently evaluate Software Life Cycle Process (SLCP) characteristics, this part of the software supportability evaluation consists of new evaluation criteria along with recommendations for the procedures, source materials, and responsible personnel necessary to accomplish the evaluation. Adapting and integrating the new criteria and procedures within the current AFOTEC evaluation structure is required in order to obtain the necessary evaluation scores for input to the RAMSS.

b. The complete set of criteria and guidelines for their use are presented in appendix A. This section provides a concise summary of the requirements for the SLCP evaluation criteria, the structure of the criteria, and guidelines for conducting the evaluation of the software life cycle for these criteria.

5.2 REQUIREMENTS.

The SLCP evaluation criteria and the associated evaluation procedures are subject to several constraints and/or requirements listed below.

(1) Requirement 1: The SLCP evaluation criteria shall be presented in the form of a hierarchy of characteristics such that the evaluation is conducted at the lowest level with results accumulating to higher levels of the hierarchy. Each lowest level characteristic shall be measured on the standard AFOTEC scale of 1 to 6. The SLCP hierarchy (through level 3) shall conform to the criteria shown in figure 5-1.

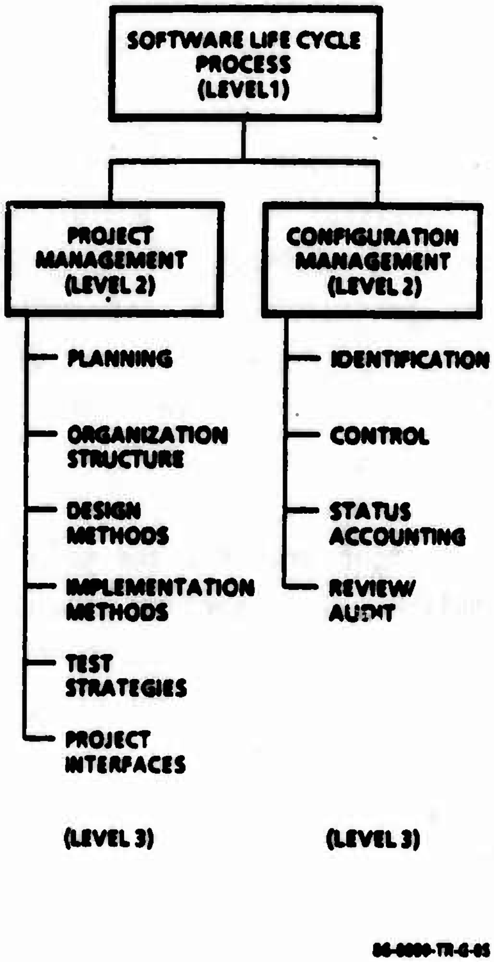

Figure 5-1. Software Life Cycle Process Evaluation Hierarchy

(2) Requirement 2: The procedures for evaluating the SLCP criteria shall integrate with the general AFOTEC OT&E process and specifically with the current software supportability evaluation process. The source materials, personnel requirements, and resource (time/system) requirements shall not significantly differ from the current available materials and requirements.

(3) Requirement 3: Although this subtask does not require the SLCP criteria and evaluation procedure to be automated, the possibility of automating the bookkeeping aspects shall be considered and recommendations given.

(4) Requirement 4: The SLCP criteria shall encompass three areas of activity: procurement, development contractor, and operation support. The focus within these areas shall be the software project and configuration management process characteristics which affect software supportability.

5.3 GUIDELINES.

The guidelines are organized into the following subsections: Background, Evaluation Responsibility, Evaluation Hierarchy, Evaluation Procedure, Evaluation Source Materials, and Evaluation Automation. A full set of materials including all questions, definitions, procedures and background is contained in appendix A. Other than page/section numbering and possible automation considerations, appendix A is structured so as to be easily adapted as an AFOTECP 800-2 pamphlet.

5.3.1 Background.

a. The software life cycle process (SLCP) is an integral part of the encompassing system life cycle. The purpose of the SLCP

evaluation is to assess those high level aspects of the SLCP which are believed to significantly affect the resulting supportability of the software products in the software product support environment.

b. The system life cycle consists of four major phases: Concept Exploration, Demonstration and Validation, Full-Scale Development, and Production and Deployment. The procurement process is typically emphasized in the first three phases of the system life cycle and repeated in the fourth phase, Production and Deployment, as required throughout a system's operational life. The first three phases each culminate in a major decision that is marked with a milestone. These milestones have attainment criteria which must be satisfied before proceeding to the next.

c. The system procurement strategy may cause system developments to skip phases or to have various life cycle activities in any or all phases. If a phase is skipped, attainment criteria for that phase must be accomplished during the previous phase.

d. For systems containing computer resources, the system life cycle phases entail the following activities:

(1) <u>Concept Exploration</u> - Explore the role of computer resources within the system and plan for computer resources within the system life cycle.

(2) <u>Demonstration and Validation</u> - Define system requirements, including those allocated to computer resources, and determine the feasibility of alternative computer resource approaches to achieving the required operational and support capability.

(3) <u>Full-Scale Development</u> - Contract for and manage the development of computer resources (operational and

support), including computer hardware and software, and determine their suitability for production.

(4) Production and Deployment - Deliver systems containing computer resources to their operational site(s) and support computer hardware and software during the system's operational life.

e. The computer software development cycle consists of six activities: requirements analysis, preliminary design, detailed design, coding and unit testing, Computer Software Component (CSC) integration and testing, and Computer Software Configuration Item (CSCI) level testing. These activities include corresponding reviews, products, and baselines. Whenever computer software is developed, the corresponding activities, reviews, products, and baselines are applicable; these activities may be repeated if the software is redeveloped or modified during any phase of the system life cycle. The activities can occur sequentially, can overlap in time, or can proceed concurrently. In the latter case, different portions of the software are developed in parallel, each portion proceeding sequentially through the six activities.

f. Although computer software development typically occurs in the Full-Scale Development Phase, it may also occur during other phases. For example, Concept Exploration may require the development of a computer software model, Demonstration and Validation may involve the development of computer software for a prototype system, and Production and Deployment may necessitate development of a major new computer software capability in order to support an evolving system requirement. In fact, it is common for the system life cycle to entail computer software development in several phases. The procurement of computer software for a defense system must be an integral part of the system process. However, procurement events for computer software may not occur at the same time as those for other components

of the defense system. This condition may occur, for example, when computer software is developed or modified during more than one phase of the system life cycle. Typically, computer software is a major computer resource element and may be managed according to a different schedule. For this reason, the computer software development cycle must be viewed in the context of the system life cycle.

g. The procurement activity and the quality of the resulting procurement documents and product reviews will greatly affect the supportability of the resulting software products. Within the procurement activity, the software development activity and the transition from development to operation support will greatly affect the supportability of the resulting software products. The planning for and design of the software operation support life cycle process will greatly affect the eventual software supportability.

h. Within the three activities of procurement, development, and operation support there are two major factors which affect software supportability. These software life cycle process factors are software project management and software configuration management.

i. For the procurement, development, and operation support activities the underlying characteristics of the two major factors differ somewhat. For example, a procurement project manager, development contractor project manager, and support block release project manager have different responsibilities. However, each of these managers can affect the software's supportability.

j. Within the major factors of project management and configuration management, consistent lower level characteristics are needed across each of the procurement, development contractor and operation support activities. Project management requires extensive planning, a good organizational structure, use of consistent design/code/test methods, and well defined external organizational interfaces.

Configuration management encompasses the functional tasks of identification of products, control of the process by which modifications to the products are approved and implemented, account information to help understand status of approved/unapproved modification requests, and review of the complete configuration management process and records to assure that configured software baselines are being properly managed.

k. The criteria for assessing the SLCP impact upon the supportability of a particular set of software products have been derived from the considerations discussed above. Current DoD initiatives which are likely to affect the form and content of these criteria include the Ada language development (MIL-STD-1815A, reference 1.4.11), the Defense System Software Development Standard (DoD-STD-2167, reference 1.4.12), the Software Technology for Adaptable, Reliable Systems (STARS, reference 1.4.13), the updated DoD Test and Evaluation Policy (DoDD 5000.3, reference 1.4.14) and the associated guidelines for software test and evaluation (reference 1.4.15) produced by the Software Test and Evaluation Project (STEP). These initiatives along with current practices are the foundation for defining specific evaluation characteristics.

5.3.2 Evaluation Responsibility.

a. The Software Test Manager (STM) and, when assigned, the Deputy for Software Evaluation (DSE) are the core of AFOTEC personnel responsible for assuring that an adequate software supportability evaluation is conducted. Their responsibilities vary from early involvement in advance planning for OT&E to attending development activity key reviews such as PDR, CDR, FCAs, and various working group meetings. These personnel are responsible for collecting DT&E software development information which can be used during OT&E, and as the field test team resident software experts. It is their responsibility to make sure the OT&E of the software is properly addressed throughout the software life cycle.

b. Because of the close association of the STM/DSE with the overall software procurement development and support processes, it is recommended that these personnel have the responsibility for assuring that the SLCP evaluation is properly conducted. This means the STM/DSE must either complete the SLCP questionnaire, or make sure other qualified personnel complete the questionnaire. In most cases it is envisioned that the necessary information to complete an SLCP evaluation will come from procurement documents (such as the SON, PMD, RFP, TEMP, CRISP, O/S CMP, CRLCMP and working group documents), development project reviews (such as PDR, CDR, FCA, PCA), and software support resources documents (such as the CRISP, O/S CMP, project and configuration management plans). Additional information should be derived from knowledgeable personnel in the procurement activity development contractor and operation support activity. This evaluation information should be accumulated over the period of OT&E participation in the system software life cycle process.

5.3.3 Evaluation Hierarchy.

a. The hierarchy of major factors, characteristics and lower level characteristics is derived from considerations described in section 5.3.1 and the requirements of section 5.2. This hierarchy is illustrated in figure 5-1. The concept is to evaluate at a high level the effect on software supportability of the software procurement, development, and operation/support activities from a management viewpoint. These evaluation measures are partitioned as appropriate across the level 3 characteristics shown in figure 5-1. These measures are then accumulated to the higher levels to arrive at a software life cycle process supportability evaluation measure. This measure is then integrated with the Software Product and Software Support Resources measures to obtain an overall software supportability evaluation measure.

b. The evaluation major factor values at level 2, along with major factor values from level 2 of the Software Product and Software Support Resources evaluations, are used in a regression equation to determine overall software supportability risk. The major factors which are drivers for this risk are also determined. The specific questions and guidelines for interpretation are described in appendix A.

5.3.4 Evaluation Procedure. The SLCP evaluation procedure is an embedded part of the RAMSS and the general software supportability evaluation process as shown in figure 5-2. The specific aspects of the SLCP evaluation are briefly described in the following paragraphs, and in appendix A.

5.3.4.1 Planning the Evaluation.

a. It is necessary for the STM/DSE to carefully plan for the collection of required SLCP data in order to adequately complete the SLCP evaluation questionnaire. The STM/DSE should review the SLCP questionnaire during AFOTEC advanced planning along with the likely sources for answers to the SLCP questions (see appendix A). A timetable should be developed as part of the evaluation plan which specifies when the identified source documents will be available, program reviews will be held, tests will be conducted, and key personnel can be visited to retrieve the information needed to answer the questions during the "official" conduct of the evaluation. Furthermore, problems/concerns noted by AFOTEC personnel during this planning and data collection phase can be presented to procurement and development contractor personnel for possible early life cycle resolution.

b. This SLCP focus during the OT&E planning process does not cause a significant change in the usual process. Most source resources for question resolution will be similar from system to

PLAN EVALUATION

- ESTABLISH BASELINE SS ESTIMATE
- TAILOR ESTIMATE TO LEVEL OF EVALUATION
- ESTABLISH EVALUATION STRUCTURE FOR
  - SOFTWARE PRODUCTS
  - SOFTWARE SUPPORT RESOURCES
  - SOFTWARE LIFE CYCLE PROCESS

↓

CONDUCT EVALUATION

- CALIBRATE EVALUATION QUESTIONNAIRES AND EVALUATORS. EXPLAIN BASELINE SS ESTIMATE AND RELATIONSHIP TO EVALUATION METRICS AND RISK MEASURES
- COMPLETE EVALUATION AT LEVEL DESIGNATED BY PLAN
  - EVALUATOR INFORMATION AND COMMENTS
  - EVALUATION METRICS

↓

ANALYZE EVALUATION RESULTS

- COMPUTE MEASURES OF RISK AND RANGE OF VARIANCE
- CONSTRUCT RISK PROBABILITY DISTRIBUTION FUNCTIONS BASED UPON MEASURES OF RISK AND HISTORICAL/HEURISTIC MAINTENANCE CURVE SHAPES.
- COMPUTE SUPPORTABILITY RISK (HI/MED/LO) AND RISK DRIVERS
- PERFORM TRADEOFF ANALYSIS USING MEASURES OF RISK, RISK DRIVERS, AND HISTORICAL SUPPORT DATA TO DETERMINE POSSIBILITIES FOR REDUCTION OF SS RISK AND CONSEQUENCES OF RESIDUAL RISK
- DETERMINE EVALUATION RELIABILITY

↓

REPORT RESULTS OF EVALUATION

- REPORT OVERALL SS RISK (TO APPROPRIATE REPORT LEVEL)
- HIGHLIGHT SS RISK DRIVERS
- INDICATE ALTERNATIVES TO REDUCE SS RISK
- PRESENT CONSEQUENCES OF ASSUMING SS RISK

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Figure 5-2. Integration of RAMSS and the Software Supportability Evaluation Process

system. For the most part, the SLCP questionnaire can serve as a simple checklist for AFOTEC SLCP concerns addressed during OT&E planning and software system data collection processes.

c. During the data collection it should also be possible for the STM and DSE to establish a perspective on the possible ranges for the User/Supporter Baseline Estimate data. For example, information from the contractor development activity should indicate how often changes are being made to the development baseline and the nature of those changes (type, complexity). The trend over time for these change data and the number and skill level of the development contractor personnel will be an indicator of the associated data required for the User/Supporter Baseline Estimate (see section VI).

5.3.4.2 Conducting the Evaluation. Conducting the SLCP evaluation consists of the formal completion of the SLCP questionnaire responses by the STM, DSE and other designated personnel. Previously collected data, updated so as to reflect current software life cycle process status, can be used as a basis for the responses. The User/Supporter Baseline Estimate can be compared to associated change data and personnel requirements during development to help determine the overall impact of the software maturity upon the software's supportability. Once the question responses have been completed, the responses are entered into the RAMSS automated support tool data base for analysis.

5.3.4.3 Analyzing Evaluation Results.

a. The RAMSS automated support tool provides SLCP analysis results in the form of evaluation averages at each level of the hierarchy, percentile of the SLCP evaluation scores relative to all evaluation data base SLCP evaluation scores, and the relative impact of the SLCP major evaluation factors (project management and configuration management) upon the overall software supportability risk assessment.

b. The specific interpretation and form of the SLCP analysis results as part of the RAMSS analysis are described in more detail in the RAMSS User's Handbook (reference 1.4.6).

5.3.4.4 Reporting Results of Evaluation. The SLCP evaluation results are reported as part of the overall RAMSS results. The form of these results is dependent upon AFOTEC reporting requirements. The output from the RAMSS automated support tool forms a basis for the reporting of these results as described in the RAMSS User's Handbook (reference 1.4.6).

5.3.5 Evaluation Source Materials. A summary of potential source resources for use in the SLCP evaluation is presented in this section. There is some overlap in the use of resources across process activities and evaluation factors. A list of source resources is shown in figure 5-3. These source resources are meant to be reasonably thorough, but not necessarily complete. Guidelines for use of these materials for each question are presented in appendix A.

5.3.6 Evaluation Automation.

a. The evaluation procedure described in section 5.3.4 and in more detail in appendix A is essentially manual. Since there is only one questionnaire and a reasonably finite set of questions, it is not too difficult to manually average the low level evaluation metrics to compute the evaluation metrics at level 3 of the SLCP hierarchy. However, it is inconvenient and does not allow for various subgroup computation.

b. It would be very simple to create a data base of questions and requirement statements which could be used as an automated aid for the SLCP evaluation bookkeeping functions.

Directives, Regulations, Standards

1. DoDD 5000.1, Major System Acquisition, 19 Nov 1985.
2. DoDI 5000.2, Major System Acquisition Procedures, 19 Nov 1985.
3. DoDD 5000.3, Test and Evaluation, 26 Dec 1985 (DRAFT).
4. DoDD 5000.3 M-3, Software Test and Evaluation Manual, Oct 1985.
5. DoDD 5000.29, Management of Computer Resources in Major Systems, 26 Apr 1976 (In Revision).
6. DoDD 5000.31, Higher Order Programming Language (HOL) Standardization Policy for Embedded Computers, 10 Jun 1983.
7. AFR 800-14 Vol. I, Management of Computer Resources in Systems, 12 Sep 1975.
8. AFR 800-14 Vol. II, Acquisition and Support Procedures for Computer Resources in Systems, 26 Sep 1975.
9. AFR 55-43, Management of Operational Test and Evaluation, 28 Jun 1985.
10. AFR 65-3, Configuration Management, 1 Jul 1974.
11. AFR 80-14, Test and Evaluation, 12 Sep 1980.
12. AFR 800-4, Transfer of Program Management Responsibility, 15 Jun 1982.
13. AFSCP 800-48, Software Management Indicators, 9 Dec 1985.
14. AFOTECR 55-1, AFOTEC Operations Regulation, 1 Jun 1985.
15. DoD-STD-2167, Defense System Software Development, 4 Jun 1985.
16. DoD-STD-2168, Software Quality Evaluation, 24 Apr 1985 (DRAFT).

Figure 5-3. SLCP Evaluation Source Resources

17. DoD-STD-480A, Configuration Control - Engineering Changes, Deviations and Waivers, 12 Apr 1978.

18. DoD-STD-482A, Configuration Status Accounting Data Elements and Related Features, 1 Apr 1974.

19. MIL-STD-483A, Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs, 4 Jun 1985.

20. MIL-STD-490A, Specification Practices, 4 Jun 1985.

21. MIL-STD-1521B, Technical Reviews and Audits for Systems, Equipments, and Computer Software, 4 Jun 1985.

22. MIL-S-52799A, Software Quality Assurance Program Requirements, 1 Aug 1979.

23. Joint Regulation, Management of Computer Resources in Defense Systems, 30 Dec 1983 (DRAFT).

24. Joint Regulation, Data Item Descriptions, 4 Jun 1985.

25. TRW Guidebook Series, An Air Force Guide to Computer Program Configuration Management, Aug 1977.

26. POWER System Manager's Manual, 1983.

27. ANSI/IEEE Std 828-1983, Software Configuration Management Plans, 23 Jun 1983.

28. ANSI/IEEE Std 829-1983, Software Test Documentation, 19 Aug 1983.

Project Specific Documents

1. Program Management Directive (PMD)
2. Program Management Plan (PMP)
3. Test and Evaluation Master Plan (TEMP)
4. Computer Resources Life Cycle Management Plan (CRLCMP)

Figure 5-3. SLCP Evaluation Source Resources (Continued)

5. Computer Resources Integrated Support Plan (CRISP)
6. Operational/Support Configuration Management Procedures (O/S CMP)
7. Development Test and Evaluation Plans
8. Operational Test and Evaluation Plans
9. Contractor Computer Program Development Plan (CPDP)
10. Contractor Software Configuration Management Plan (SCMP)
11. Contractor Software Quality Assurance Plan

Figure 5-3. SLCP Evaluation Source Resources (Concluded)

c. For the present, it is convenient to integrate the SLCP evaluation metric entry and computation at the lowest level of the hierarchy into the RAMSS data base (reference 1.4.6). Although this is not consistent with the level 3 data entry to RAMSS for the Software Product and Software Support Resources evaluations, it does automate the SLCP evaluation computations. In addition, it does not preclude entry of SLCP evaluation results at the level 3 if another automated bookkeeping (or alternate set of low level characteristics) is implemented (e.g., an ASSET-SLCP data base).

VI. User/Supporter Baseline Estimate

SECTION VI

USER/SUPPORTER BASELINE ESTIMATE GUIDELINES

6.1 INTRODUCTION.

a. The User/Supporter Baseline Estimate is derived from a combination of historical data in the RAMSS data base, and the experience of the system's Using Command/Supporting Command personnel. The Estimate summarizes the general resources and level of support activity required to maintain the subject software system. Specifically, the Estimate consists of system software identification information, block release cycle, direct personnel full time equivalents and skill level, and the estimated change request profile over the first few (up to three) block releases.

b. The User/Supporter Baseline Estimate derivation is dependent upon cooperation from the system's Using and Supporting Command personnel. This cooperation and the consequent discussions concerning the support requirements may be the most valuable result of the derivation. Typically the steps to deriving an Estimate include:

(1) Prepare draft Estimate from RAMSS data base using similar systems and best guess from CRISP information

(2) Obtain feedback from Supporting Command personnel on draft

(3) Obtain feedback from Using Command personnel on draft and Supporting Command comments

(4) Prepare update to draft

(5) Iterate steps 2, 3, 4 as often as necessary.

c. The derivation of the User/Supporter Baseline Estimate should be completed prior to the software supportability evaluation. The Estimate is used as part of the evaluator calibration/orientation part of the Software Product, Software Support Resources, and Software Life Cycle Process evaluations. An example of a User/Supporter Baseline Estimate is presented in figure 6-1 along with the estimated risk computed by the RAMSS automated support tool.

6.2 REQUIREMENTS.

The derivation and use of the User/Supporter Baseline Estimate is a unique feature of the RAMSS. The impact of this Estimate upon the current Software Supportability Evaluation is subject to several constraints and/or requirements listed below.

(1) Requirement 1. The RAMSS requires the derivation and use of a User/Supporter Baseline Estimate. It is not a requirement as to how this Estimate is derived

(2) Requirement 2. It must be possible to derive the data for a draft User/Supporter Baseline Estimate even if the Using and Supporting Command personnel are not cooperative or cannot agree

(3) Requirement 3. The impact on OT&E personnel resources for the derivation and use of a User/Supporter Baseline Estimate must be minimal. The procedure for deriving such an Estimate must integrate naturally with the current AFOTEC OT&E process

(4) Requirement 4. There must be a way to create, store, and retrieve a User/Supporter Baseline Estimate as part of the RAMSS data base and automated tool support. An Estimate report for use during evaluations must be able to be generated from the automated tool support for RAMSS.

EVALUATION REPORT A1: USER/SUPPORTER BASELINE CONCEPT

SYSTEM PROFILE

SYSTEM : JTIDS

SWSYSTEM : CLASS 2 TERMINAL (C2T)

SWTYPE : C-E

SUPPORTER : WR-ALC

USER : HQ-TAC

SUPPORT CONCEPT

RELEASE SCHEDULE: 9 MONTH BLOCK RELEASE CYCLE WITH 3 MONTH OVERLAP

SUPPORT STAFF : 16 PERSONS, 10% DEDICATED, AVG SKILL 3.0

10 PERSONS, 95% DEDICATED, AVG SKILL 3.0

BASELINE SUPPORT PROFILE

BLOCK	TOTAL # CHANGES	TYPE (C, H, V)	COMPLEXITY (H, M, L)	PRIORITY (E, U, N)
1	26	(26, 0, 0)	(0, 0, 26)	(0, 0, 26)
2	35	(29, 6, 0)	(2, 11, 22)	(0, 4, 31)
3	46	(34, 8, 4)	(4, 14, 28)	(4, 4, 38)

ESTIMATED SOFTWARE SUPPORTABILITY RISK

BLOCK	AVAILABLE PERSON MONTHS PER CHANGE (PMPC)	ESTIMATED PMPC	ESTIMATED RISK
1	3.20	1.98	0.31
2	1.90	2.48	0.61
3	1.45	2.89	0.77

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Figure 6-1. Example User/Supporter Baseline Estimate

6.3 GUIDELINES.

The guidelines for deriving the User/Supporter Baseline Estimate and integrating its use into the software supportability evaluations are described in the following subsections.

6.3.1 Derivation of User/Supporter Baseline Estimate. The steps in the derivation of a User/Supporter Baseline Estimate are illustrated in figure 6-2 and described in the following paragraphs.

6.3.1.1 STEP 1: Generate Draft Version Using RAMSS. The automated tool support for RAMSS (reference 1.4.6) provides the capability to derive an initial draft version of the User/Supporter Baseline Estimate from historical data and direct input. The options include:

(1) Enter data as determined from discussions with the Using and Supporting Command personnel, CRISP or other documentation, and/or from best guess

(2) Select baseline estimate data from an entry in the maintenance release data base

(3) Select baseline estimate data from the average of current maintenance release data (all or restricted to the systems of the same software type as the subject system)

(4) Select baseline estimate data from among the current baseline agreement entries.

The data to be derived/entered includes:

(1) System Identification Data: system name, software system name, software system type, Using Command, and Supporting Command/support contractor name

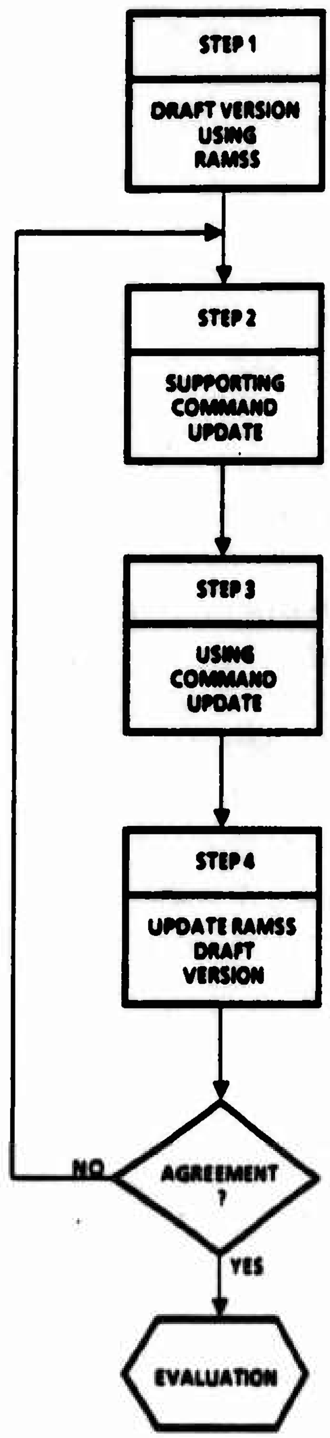

Figure 6-2. Derivation of User/Supporter Baseline Estimate

(2) Software Support Concept: block release duration and any overlap in releases, number of full time equivalent (number of persons times percentage dedicated) support persons, and average skill level of personnel

(3) Baseline Change Profile: total number of changes, number of changes by type, number of changes by complexity, and number of changes by priority, as expected for up to three block releases.

A "change" is a formal software change request which results in a modification to a block release if accepted for implementation.

6.3.1.2 STEP 2: Obtain Update to Draft Version from Supporting Command.

a. The current draft version of the User/Supporter Baseline Estimate should be discussed with the Supporting Command personnel. This discussion could be during an onsite visit by AFOTEC personnel, an onsite visit by Supporting Command personnel to AFOTEC, a part of a regularly scheduled project working group meeting (e.g., the Computer Resources Working Group (CRWG)), or simply through phone conversations.

b. It should be emphasized that these baseline estimates are very dynamic and represent a combination of historical data and an educated but subjective estimate based upon knowledge about the actual software system. Initiation or expanded continuation of discussion among Using Command, Supporting Command, DT&E, and OT&E personnel is a very important by-product of this derivation process. Much of the necessary information should already exist in the CRISP or other planning documents.

c. This step may be iterated as often as necessary until the Supporting Command personnel are reasonably comfortable with the Baseline Estimate.

6.3.1.3 STEP 3: Obtain Update to Draft Version from Using Command.

a. The current draft version and any Supporting Command updates should be discussed with the Using Command personnel. This process is very similar to STEP 2 with the exception that the Using Command personnel will tend to have a more general view of the support resource requirements. The block release duration, total number and skill level of personnel, and total number of change requests per block release should be discussed. More detailed information such as type, complexity, and priority of changes are likely to be only lightly discussed. Occasionally the priority of changes will be discussed.

b. The same emphasis and iteration as in STEP 2 is appropriate for this STEP 3.

6.3.1.4 STEP 4: Update Draft Version Using RAMSS. Using the same automated support tools as in STEP 1, the draft version of the User/Supporter Baseline Estimate should be updated. The updated version can be printed as a report, and if necessary redistributed to the Supporting and Using Command personnel for further comments and iteration. After an appropriate series of updates and iterations, there should be some consensus of the Estimate. This Estimate can then be used to obtain the initial estimate of the software supportability risk and as part of the software supportability evaluation.

6.3.2 Use of User/Supporter Baseline Estimate.

a. The User/Supporter Baseline Estimate is used for several purposes:

(1) Catalyst for indepth discussions of software support resources and life cycle process management requirements

(2) Information for use during the software supportability evaluations, primarily for evaluator orientation.

b. The first use of the Estimate as described above is the most important. Without the discussion, the important support resource issues would not come to be known, and a valid Estimate would be unlikely. This knowledge allows for more precise personnel requirements to be specified, for a better understanding of the block release cycle, and a more realistic set of change profile counts. The discussion also stimulates a better understanding of the deficiencies, benefits and major issues in the project and configuration management life cycle processes, all of which should be reflected in the CRISP/CRLCMP and/or O/S CMP.

c. The Estimate is input to the Software Product, Software Support Resources, and Software Life Cycle Process evaluations so as to provide additional system knowledge to aid an evaluator's responses based upon expected software maintenance activity and resource requirements.

d. The Estimate can be derived without Using/Supporting command participation, especially when early system software supportability assessments are derived. However, due to the benefits derived from command participation, it is highly recommended.

C. Life Cycle Process Evaluation Guide

APPENDIX A

SOFTWARE LIFE CYCLE PROCESS EVALUATOR'S GUIDE

The purpose of this appendix is to provide the Software Test Manager (STM) and Deputy for Software Evaluation (DSE) with the information needed to accomplish the Air Force Operational Test and Evaluation Center's (AFOTEC's) software life cycle process evaluation. In this appendix, "software life cycle process" is limited in scope to software project management and software configuration management assessments.

This appendix is an evolutionary document that should be updated periodically. Questions contained are intended to be only a representative sample of software life cycle process questions. This version represents an initial version and your written inputs are solicited for the next update.

This appendix is intended to be a volume in a series of Software Operational Test and Evaluation Guidelines prepared by the Software Evaluation Division of the Logistics Directorate. It is intended for use in the operational test and evaluation of software. Comments should be directed to the Office of Primary Responsibility (OPR). The series of guidelines are:

AFOTEC Pamphlet 800-2, Volume 1 - Management of Software Operational Test and Evaluation

AFOTEC Pamphlet 800-2, Volume 2 - Reserved

AFOTEC Pamphlet 800-2, Volume 3 - Software Maintainability - Evaluator's Guide

AFOTEC Pamphlet 800-2, Volume 4 - Software Operator-Machine Interface - Evaluator's Guide

A.1 GENERAL.

a. Software supportability is a measure of the adequacy of personnel, resources, and procedures to facilitate the support activities of modifying and installing software, establishing an operational software baseline, and meeting user requirements. Software supportability is a function of the quality of the software

products, the capabilities of the software support resources, and the life cycle management processes which control the procurement, development, operation and support of the software.

b. The focus of this guide is upon the life cycle management processes of software project management and software configuration management.

A.2 OVERVIEW.

a. The STM/DSE should read paragraphs A.1 through A.9 in their entirety and understand the evaluation concept and procedures before beginning any evaluation. These pages provide the evaluator with:

(1) A background of the AFOTEC software maintainability evaluation concept

(2) A basic understanding of the evaluation procedures

(3) Detailed instruction for using the software life cycle process questionnaires.

b. Attachment A1 contains the questionnaires and explanatory information on each question. This information is provided in an attempt to ensure that the STM/DSE fully understands the intent of each question. Included are definitions of terms, examples, explanations, and special case response instructions, as necessary. Attachment A1 is designed to be used as the source of questions for the evaluation.

c. Attachment A2 contains a summary list of all the questions for quick reference. Attachment A3 is a glossary of terms.

d. Questions are not listed in the order of importance.

A.3 SOFTWARE LIFE CYCLE PROCESS EVALUATION METHOD.

a. The method for evaluating the software life cycle process is based on the use of closed-form questionnaires with optional written rationales justifying the evaluation score assigned to a question. These questionnaires are designed to determine the degree to which certain desirable attributes affecting software supportability are or will be part of the software life cycle process. The elements of the software life cycle process and their relationships are shown in figure A-1 and are described in the following paragraphs. The hierarchical evaluation structure shown in the figure enables the STM/DSE to identify potential software supportability problems at various levels: category/major factor (project management, configuration management), characteristics (planning, organizational structure, design methods, implementation methods, test strategies, and project interfaces), low level characteristics (individual questions), or some combination. Each question should be evaluated on the basis of its characteristic.

b. Software life cycle process management is a combination of the policy, methodology, procedures, and guidelines applied in a software environment to the software development and support life cycle activities. The major management aspects for purposes of software supportability can be grouped into two categories or major factors: software project management and software configuration management. The major factor characteristics are evaluated with respect to their impact upon software supportability considerations. All life cycle phases and the activities of procurement, development, operation and support are applicable.

c. Software project management is concerned with producing a software product: either the initial production baseline or a version of the production baseline. During development there are many management characteristics which will influence the supportability of

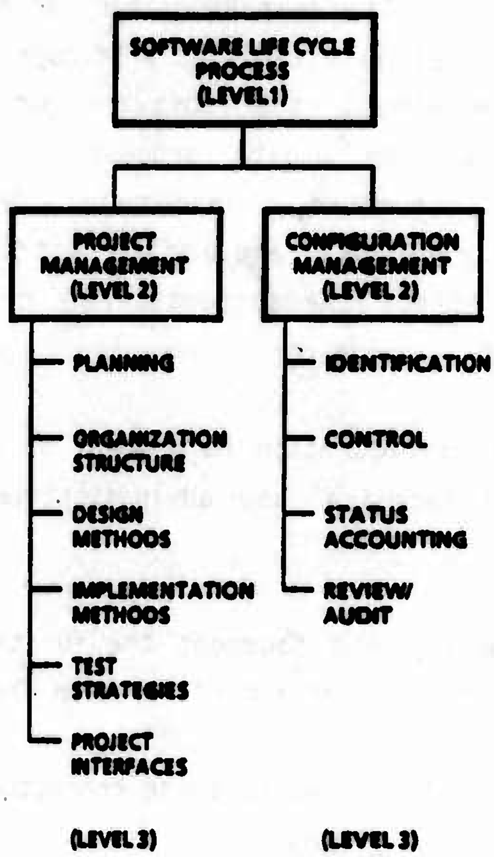

Figure A-1. Software Life Cycle Process Evaluation Hierarchy

the software. Procurement activity is responsible for overall project management including planning for supportability. Development contractor activity is responsible for managing the delivery of the production baseline within the procurement activity requirements. During post deployment the software support activity directly controls the baseline update process. Lack of planning, poor organizational structure, inadequate design/implementation/test methods and strategies, and poor interfaces among responsible activities all affect the supportability of the resulting software product.

d. Software configuration management is concerned with providing a means through technical and administrative direction and surveillance to:

(1) Identify and document the functional and physical characteristics of a configuration item,

(2) Control changes to those characteristics, and

(3) Record and report change processing and implementation status.

The three areas that produce these results are configuration identification, configuration control, and configuration status accounting. A fourth area, configuration audits, verifies that a completed product and its documents meet contractual requirements. The procurement, development, operation and support activities all have configuration management responsibilities to assure that the baseline production products and subsequent revisions are properly controlled. These configuration management responsibilities have an impact upon the supportability of the software products.

e. Responsibility for the procurement activity rests with those government/military organizations which assure delivery of a production system. Primary organizations include the cognizant program office and the implementing command. The supporting command and using command have important interfaces with the primary organizations during the procurement process. Organizations responsible for DT&E, OT&E, and perhaps IV&V have specific roles in the procurement process.

f. Responsibility for the development contractor activity rests with those government/private organizations which accomplish the full scale development of the production system. Primary organizations include the contractor.

g. Responsibility for the operation support activity rests with those government/military/private organizations which operate/use the production system and/or provide support for the production system. Primary organizations include the using command and supporting command. Contractor organizations may provide support for the supporting command.

A.3.1 Software Project Management Test Factors. The software project management evaluation is based on six characteristics or test factors: planning, organization structure, design methods, implementation methods, test strategies, and project interfaces. Definitions of these test factors and discussions of their application in the evaluation process are given in the following paragraphs.

A.3.1.1 Planning.

a. The software project management process utilizes planning which enhances software supportability to the extent that plans for the development, test, product transfer, operation and support exist, have been implemented, have been appropriately coordinated across activities, and satisfy contractual and/or regulation requirements.

b. Major planning documents for the procurement activity include the Program Management Directive (PMD), Program Management Plan (PMP), Test and Evaluation Master Plan (TEMP), Computer Resources Integrated Support Plan (CRISP), Operation/Support Configuration Management Procedures (O/S CMP), the Development Test and Evaluation (DT&E) plans, and the Operational Test and Evaluation (OT&E) plans. In the Joint Logistics Commanders Software Standardization program, the CRISP and O/S CMP are combined into a Computer Resources Life Cycle Management Plan (CRLCMP).

c. Major planning documents for the development contractor activity include the System/Segment Specification, the Software Development Plan (SDP), Software Configuration Management Plan (SCMP), Software Quality Assurance Plan (SQAP), Software Standards and Procedure Manual (SSPM) and the Software Test Plan (STP).

d. Major planning documents for the operation support activity include the TEMP, DT&E plans, OT&E plans, CRISP, O/S CMP, and CRLCMP.

e. One of the most important results of good planning is the coordination of information across the various planning documents to minimize redundancy and satisfy the necessary content requirements of the plans. The conciseness and level of detail of planning information is very important. Frequently plans act as a place holder for "real" information, serving a role little better than a "TBD". To say that structured programming standards will be followed is not precise enough in the Software Standards and Procedure Manual. Precise programming requirements which represent the contractor's definition of "structured programming standards" must be specified in a manner suitable for quality assurance testing for conformance. As another example, it is not satisfactory to indicate in the CRISP that support resources space requirements are 4,800 square feet. It is necessary to indicate how that space is allocated among support personnel office space, system support space, storage/library space,

and any other space allocations which might be peculiar to the particular application system. Furthermore, a top level facility layout showing the physical relationship among the space allocations is appropriate.

f. When systems have interservice operability requirements, then plans for the appropriate interservice interfaces and joint activities should be clearly specified, particularly the plans for supporting the software.

g. When development contractor activity involves subcontractors, the plans for managing the subcontractor effort and the subcontractor internal plans for managing their efforts should be clearly specified, particularly any plans for supporting deliverable software.

h. A good plan will possess a concise statement of the objectives of the plan, the techniques and methods by which the plan will be implemented, the responsible organizational elements for making sure the plan is implemented and evolved as necessary, the schedule by which the objectives of the plan are to be accomplished, and the relationships of the plan to any other system elements.

i. Planning is evaluated for how well the life cycle plans address software supportability.

A.3.1.2 <u>Organization Structure</u>.

a. The software project management process organization structure enhances software supportability to the extent that the physical structure, functional responsibilities, external interfaces and assigned personnel provide for continuity over the software life cycle phases, and have proper interfaces with organizations responsible for software support.

b. The procurement activity must have an organization structure which provides continuity across all life cycle phases and through each milestone. The organization structure must provide for adequate dissemination and coordination of information among all activities. Organization elements must provide functions for project oversight, configuration management, quality evaluation, project reviews and audits, testing and evaluating transfer of responsibility, and plans and policies.

c. The development contractor activity must have an organization structure which matches the work breakdown structure and provides continuity throughout all full scale development activities and the transition into post deployment support. Appropriate organizational elements should exist for internal configuration management, quality assurance, test and evaluation, product development, and procurement/support contractual interface activity.

d. The operation support activity must have an organization structure which satisfies mission requirements within the requirements imposed by the procurement and development activity organization and applicable regulations and directives. Organization elements should be established early in the development phase to assure proper transition to post deployment support through understanding of the software support requirements.

e. Organization structure is evaluated for how well software supportability issues are able to be addressed within the physical form of the structure and the functional responsibilities of the organizational elements using the assigned personnel.

A.3.1.3 <u>Design Methods</u>.

a. The software project management process utilizes design methods which enhance software supportability to the extent that

design methodology standards and conventions are: 1) documented, followed, and validated through quality assurance, 2) can be transitioned to support activity, and 3) produce adequate design specifications which reflect supportability characteristics.

b. The procurement activity design methods are reflected in the requirements imposed upon the development contractor activity through the system/segment specification and the request for proposal. Procurement monitoring of development contractor design activities and acceptance of those activities is also a reflection of the procurement activity design methods.

c. The development contractor activity design methods should be defined in an internal standards and convention manual, and validated by a quality assurance function. The methods should reflect use of a consistent methodology, traceability between requirements and production products, traceability of design decisions, information hiding, and use of techniques to enhance the software product characteristics of modularity, descriptiveness, consistency, simplicity, expandability, and instrumentation. Automated tool support as an aid to development design and support design evolution is an important part of the development contractor design methods.

d. The operation support activity design methods should be defined at a high level in a procurement activity requirements specification, and at a lower level by an internal support standards and conventions manual. The methods should have a close similarity to the methods used by the development contractor activity in order to facilitate transition of the software design evolution to the support activity.

e. Design methods are evaluated for characteristics which indicate that software supportability has been designed into the software products.

A.3.1 Implementation Methods.

a. The software project management process utilizes implementation methods which enhance software supportability to the extent that implementation/coding/testing methodology, standards, and conventions are: 1) documented, followed, and validated through quality assurance, 2) can be transitioned to the support activity, and 3) produce supportable production products.

b. The procurement activity implementation methods are reflected in the requirements imposed upon the development contractor activity for implementation/coding standards and the process through which such standards and the form of the production products are reviewed and accepted for operation and support.

c. The development contractor activity implementation methods should be defined in an internal standards and conventions manual and validated by a quality assurance function. The methods should reflect use of acceptable implementation team organizational strategies such as the chief programmer team methods which enhance traceability among requirements/design/product, and techniques to enhance the software product characteristics of modularity, descriptiveness, consistency, simplicity, expandability, and instrumentation. Automated tool support as an aid to development implementation and change processing is an important part of the development contractor implementation methods.

d. The operation support activity implementation methods should be defined at a high level in a procurement activity requirements specification and other support documents such as the CRLCMP (or CRISP and O/S CMP). Specific methods should be defined at a low level by an internal standards and conventions manual. The methods should have a close similarity to the methods used by the development contractor activity in order to facilitate transition of the software implementation evolution to the support activity.

e. Implementation methods are evaluated for consistency with standards, availability of automated tool support capabilities in the form of software benches and integrated laboratory test beds, potential for effective use during software support, and the traceability of implemented product status and top level requirements.

A.3.1.5 Test Strategies.

a. The software project management process utilizes test strategies which enhance software supportability to the extent that the test plans, descriptions, procedures, and results have been: 1) documented, 2) can be transitioned to the support activity, and 3) provide for a consistent and systematic process for verifying and validating that software requirements have been satisfied.

b. The procurement activity test strategies are documented in the TEMP, DT&E plans and reports, OT&E plans and reports, optionally in IV&V plans and reports, the preliminary and formal qualification tests (PQTs and FQTs), and the acceptance strategies which revolve around formal reviews (e.g., SSR, PDR, CDR, TRR) and audits (e.g., FCA, PCA). The test strategies should clearly indicate software test objectives, relationships to system test objectives, relationships among the various test organizations and results (e.g. DT&E, OT&E, IV&V), contractually binding aspects of tests such as the schedule and deliverables, and precisely what tests will constitute acceptance of the production product. A test strategy for the transition period after the production decision and for a defined period of time after PMRT should be specifically addressed.

c. The development contractor activity test strategies are documented in test plans, procedures and reports. Automated support in the form of software benches, laboratory integrated test beds, and operational integrated systems has a major impact upon the effectiveness of the tests, and a clear strategy for use of such tools should

be documented, used, and early transitioned to the support activity. These test strategies should address: 1) features to be tested, 2) traceability to the requirements specifications, and 3) among the various test documents, a consistent approach to testing various levels (e.g., unit, integrated, system), environmental requirements, organizational responsibilities and interfaces, schedule, deliverables, risk and contingencies, and acceptance/approvals.

d. The operation support activity test strategies documentation is similar to the procurement activity (e.g., for the TEMP and FOT&E plans as dynamic documents) and the development contractor activity (e.g., via transition of the test plans/procedures/results and automated tools to the support activity). Coordination between the operational activity and support activity test strategies is important during post deployment due to the requirement to use operational test beds. This coordination should be reflected via resource requirements in the top level planning documents such as the TEMP, CRLCMP (or CRISP and O/S CMP) and specific software support management project (i.e., block release) internal documents. Similar test strategy characteristics as in subparagraphs c and d above should be present in the operation support activity test strategies.

e. Test strategies are evaluated for how well the strategies provide for a delivery of mature software products and retest of those products during software support.

A.3.1.6 Project Interfaces.

a. The software project management possesses organization interfaces which enhance software supportability to the extent that external project organization relationships and responsibilities are: 1) defined, 2) provide a valuable functional role, and 3) contribute to systematic cost effective procurement, development, operation and support processes.

b. The procurement activity organization interfaces are primarily with the development contractor activity, the operation support activity, interface working groups required by regulations and other higher level groups (e.g. military, DoD, federal government agencies, Congress, public). An IV&V interface may also be required. It is necessary that each of these interfaces is defined to a level of detail consistent with the particular application system. Functional purpose and responsible persons should be identified.

c. The development contractor activity organization interfaces include the procurement activity, interface working groups, and higher level internal organization elements (e.g., corporate management). An IV&V interface may also be required. In addition, if subcontractors are involved, this interface must be clearly established. Functional purpose and schedule of contact should be defined and responsible persons identified.

d. The operation support activity organization interfaces are very similar to those of the procurement activity.

e. Organization interfaces are evaluated for their effectiveness in resolving interorganization issues concerning software support.

A.3.2 Software Configuration Management Test Factors. The software configuration management evaluation is based on four characteristics or test factors: software configuration identification, software configuration control, software status accounting, and software audits. Definitions of these test factors and discussion of their application in the evaluation process are given in the following paragraphs.

A.3.2.1 <u>Software Configuration Identification</u>.

a. The software configuration management process utilizes configuration identification which enhances software supportability to the extent that the software documentation properly identifies the configuration items, their characteristics, and their relationships according to required standards and regulations.

b. The procurement activity is responsible for following existing guidelines and regulations for identification of software configuration items, and assuring that these guidelines and regulations are contractually required by the development contractor. The procurement activity is also responsible for monitoring contractor use of the guidelines and regulations to assure that the functional, allocated, developmental, and production software baselines are properly identified.

c. The development contractor activity is responsible for following contractual requirements relative to configuration management. This should include development of a software configuration management plan in which configuration identification standards and procedures for the controlled software baselines are specified. Independent of contractual requirements, internal configuration identification standards and procedures should exist.

d. The operation support activity is responsible for continuation of the same configuration identification requirements as required for the development contractor activity. In addition, certain monitoring responsibilities of the procurement activity are assured by the operation support activity. The CRLCMP, CRISP, and O/S CMP are the primary operation support activity software configuration management planning documents.

e. Configuration identification is evaluated for how well the controlled baselines are identified, unique identification problems such as multiple locations/version variations are solved, compliance with regulations and standards, and the use of automated tools to support generation and update of configuration indexes for the baselines.

A.3.2.2 Software Configuration Control.

a. The software configuration management process utilizes configuration control which enhances software supportability to the extent change decisions to software baselines are made, administered, and implemented.

b. The procurement activity makes change decisions to software baselines through a system configuration control board. Any change request to a functional, allocated, or production software baseline must be approved by the procurement configuration control board. The changes are administered by the program office's configuration management organization. Implementation is generally accomplished by the development contractor activity.

c. The development contractor activity makes change decisions to developmental software baselines. Administration of such changes should be through an internal configuration management organization. Implementation is by project software personnel. In addition, changes to the functional, allocated, or production baseline (prior to PMRT) are implemented by the development contractor activity. Interfaces among participating contractors must be established to maintain proper configuration control of the developmental products.

d. The operation support activity assumes the responsibility to implement change requests to the software baselines at PMRT. Frequently, some level of configuration control is accomplished by

the support activity prior to PMRT for ease in transition. Decisions for making changes after PMRT are shared among the using command, supporting command, any interservice commands as appropriate, and support subcontractors as appropriate. The CRLCMP, CRISP, and O/S CMP are the primary planning documents for the operation support activity software configuration management.

e. Configuration control is evaluated for how well changes to the functional, allocated, developmental, and production baselines are controlled. This evaluation includes the adequacy of control procedures and forms, the capability to transition such procedures to the support activity procedures, the adequacy of the interface control among the organizations responsible for some aspect of configuration control, and the used of automated tools to protect inadvertent change and assist in administering approved changes.

A.3.2.3 <u>Software Status Accounting</u>.

a. The software configuration management process utilizes status accounting which enhances software supportability to the extent that configuration identification and changes to the configured items are tracked and reported through a configuration index and change status reports.

b. The procurement activity is responsible for monitoring the status of the baseline development. Status accounting provides the procurement activity with visibility and traceability of baseline configurations and their changes. The program office configuration management organization should maintain official baseline status accounting reports for use by the system configuration control board.

c. The development contractor activity uses status accounting information (configuration index and change reports) for internal management visibility and traceability, and for external government reporting requirements.

d. The operation support activity uses status accounting information for coordination of software maintenance tasks that may involve many organizations in widely scattered locations, as well as for usual internal management visibility and implementation change status. The CRLCMP, CRISP, and O/S CMP are the primary operation support software configuration management planning documents.

e. Status accounting is evaluated for how well the changes to software baselines are tracked and reported, the capability of automated tools to support the tracking, and the effectiveness of interfaces for communicating status accounting information among organizational elements (e.g., program office, contractor, supporting command).

A.3.2.4 <u>Software Configuration Audit/Review</u>.

a. The software configuration management process utilizes configuration audits/reviews which enhance software supportability to the extent that the functional and physical configuration of the software baselines has been audited/reviewed for compliance with contract requirements.

b. The procurement activity is responsible for preparation and approval of the formal audits and reviews: functional configuration audit, physical configuration audit, and formal qualification review.

c. The development contractor activity is responsible for preparation and conduct/assist of the formal configuration audits and reviews. In addition, internal configuration audits should be periodically done on developmental baselines to provide assurance that the configuration identification, control, and status accounting functions are being properly administered and the resulting configuration information is consistent.

d. The operation support activity is responsible for monitoring the formal audits and reviews prior to PMRT and for preparation and conduct of updated baseline configuration audits and reviews after PMRT. The CRLCMP, CRISP, and O/S CMP are the primary operation support activity software configuration management planning documents.

e. Software configuration audit/review is evaluated for adherence to regulations and standards (such as MIL-STD-1521B), and for the planning/conduct/results associated with such audits/reviews.

A.4 SOFTWARE LIFE CYCLE PROCESS EVALUATION PROCEDURE.

The SLCP evaluation procedure is an embedded part of the RAMSS and the general software supportability evaluation process as shown in figure A-2. The particular SLCP evaluation emphasis by activity and life cycle phase applied is illustrated in figure A-3. The specific aspects of the SLCP evaluation are briefly described in the following paragraphs.

A.4.1 Planning the Evaluation.

a. It is necessary for the STM/DSE to carefully plan for the collection of required SLCP data in order to adequately complete the SLCP evaluation questionnaire. The STM/DSE should review the SLCP questionnaire during AFOTEC advanced planning along with the likely sources for answers to the SLCP questions. A timetable should be developed as part of the evaluation plan which specifies when the identified source documents will be available, program reviews will be held, tests will be conducted, and key personnel can be visited to retrieve the information needed to answer the questions during the "official" conduct of the evaluation. Furthermore, problems/concerns noted by AFOTEC personnel during this planning and data collection phase can be presented to procurement and development contractor personnel for possible early life cycle resolution.

PLAN EVALUATION

- ESTABLISH BASELINE SS ESTIMATE
- TAILOR ESTIMATE TO LEVEL OF EVALUATION
- ESTABLISH EVALUATION STRUCTURE FOR
  - SOFTWARE PRODUCTS
  - SOFTWARE SUPPORT RESOURCES
  - SOFTWARE LIFE CYCLE PROCESS

↓

CONDUCT EVALUATION

- CALIBRATE EVALUATION QUESTIONNAIRES AND EVALUATORS. EXPLAIN BASELINE SS ESTIMATE AND RELATIONSHIP TO EVALUATION METRICS AND RISK MEASURES
- COMPLETE EVALUATION AT LEVEL DESIGNATED BY PLAN
  - EVALUATOR INFORMATION AND COMMENTS
  - EVALUATION METRICS

↓

ANALYZE EVALUATION RESULTS

- COMPUTE MEASURES OF RISK AND RANGE OF VARIANCE
- CONSTRUCT RISK PROBABILITY DISTRIBUTION FUNCTIONS BASED UPON MEASURES OF RISK AND HISTORICAL/HEURISTIC MAINTENANCE CURVE SHAPES.
- COMPUTE SUPPORTABILITY RISK (HI/MED/LO) AND RISK DRIVERS
- PERFORM TRADEOFF ANALYSIS USING MEASURES OF RISK, RISK DRIVERS, AND HISTORICAL SUPPORT DATA TO DETERMINE POSSIBILITIES FOR REDUCTION OF SS RISK AND CONSEQUENCES OF RESIDUAL RISK
- DETERMINE EVALUATION RELIABILITY

↓

REPORT RESULTS OF EVALUATION

- REPORT OVERALL SS RISK (TO APPROPRIATE REPORT LEVEL)
- HIGHLIGHT SS RISK DRIVERS
- INDICATE ALTERNATIVES TO REDUCE SS RISK
- PRESENT CONSEQUENCES OF ASSUMING SS RISK

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Figure A-2. Integration of RAMSS and the Software Supportability Evaluation Process

800 SERIES (WEAPON)	MISSION ANALYSIS	CONCEPT EXPLORATION	DEMONSTRATION AND VALIDATION	FULL SCALE DEVELOPMENT	PRODUCTION AND DEPLOYMENT
300 SERIES (AUTOMATIC DATA PROCESSING)	PLANNING	CONCEPT	DEFINITION	DEVELOPMENT ¦ TEST	OPERATION AND MAINTENANCE
MAJOR OT&E ACTIVITY	• TRACK PROJECTED PROGRAMS • REVIEW CRITICAL ISSUES • PREPARE INPUTS TO PMD	• ESTABLISH REQUIREMENTS FOR OT&E OF SYSTEM • INITIATE RISK ANALYSIS • PREPARE OT&E INPUTS TO TEMP	• EVALUATE OT&E TRADEOFFS/ OPTIONS • REFINE OT&E OBJECTIVES/ SUBOBJECTIVES • MONITOR CONDUCT T&E ON PROTOTYPE SYSTEM • PREPARE INPUTS TO CRISP AND UPDATED TEMP	• MONITOR PDR CDR • UPDATE OT&E PLANS (TEMP, CRISP, O/S CMP, TPO, IOT&E) • CONDUCT IOT&E • UPDATE INPUTS TO OPERATIONS AND SUPPORT CONCEPTS • REPORT IOT&E RESULTS	• MONITOR ESTABLISHMENT OF OPERATIONAL AND SUPPORT ENVIRONMENTS • UPDATE FOT&E PLANS • CONDUCT FOT&E • REPORT FOT&E RESULTS

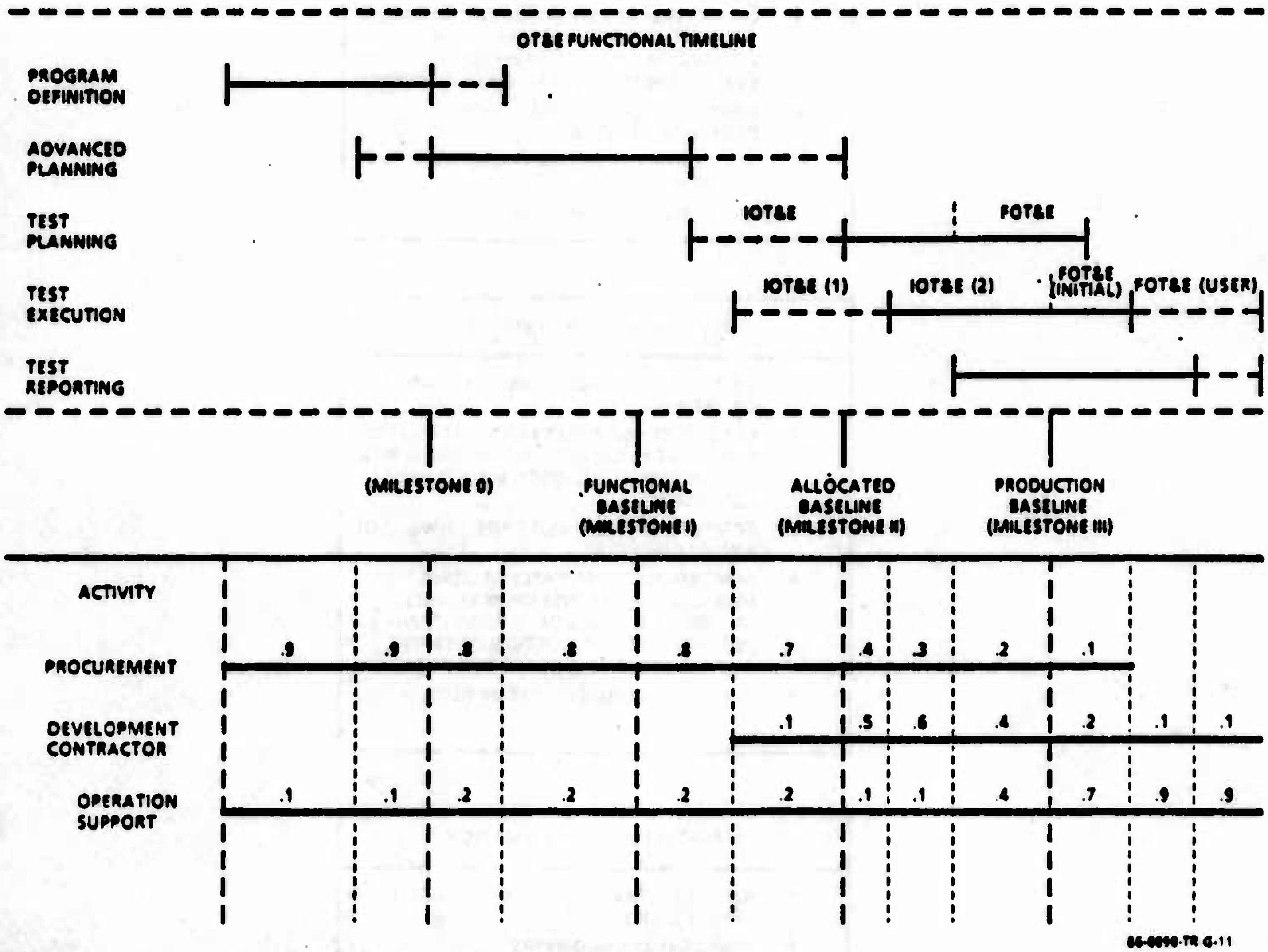

Figure A-3. Focus of SLCP Evaluation by Activity and Phase Applied (Weight Indicates Relative Emphasis for More Than One Activity During the Phase)

b. This SLCP focus during the OT&E planning process does not cause a significant change in the usual process. Most source resources for question resolution will be similar from system to system. For the most part, the SLCP questionnaire can serve as a simple checklist for AFOTEC SLCP concerns addressed during OT&E planning and software system data collection processes.

c. During the data collection it should also be possible for the STM and DSE to establish a perspective on the possible ranges for the User/Supporter Baseline Estimate data. For example, information from the development contractor activity should indicate how often changes are being made to the development baseline and the nature of those changes (type, complexity). The trend over time for these change data and the number and skill level of the development contractor personnel will be an indicator of the associated data required for the User/Supporter Baseline Estimate.

A.4.2 Conducting the Evaluation. Conducting the SLCP evaluation consists of the formal completion of the SLCP questionnaire responses by the STM, DSE and other designated personnel. Previously collected data, updated so as to reflect current software life cycle process status, can be used as a basis for the responses. The User/Supporter Baseline Estimate can be compared to associated change data and personnel requirement during development to help determine the overall impact of the software maturity upon the software's supportability. Once the question responses have been completed, the responses are entered into the RAMSS automated support tool data base for analysis.

A.4.3 Analyzing Evaluation Results.

a. The RAMSS automated support tool provides SLCP analysis results in the form of evaluation averages at each level of the hierarchy, percentile of the SLCP evaluation scores relative to all

evaluation data base SLCP evaluation scores, and the relative impact of the SLCP major evaluation factors (project management and configuration management) upon the overall software supportability risk assessment.

b. The specific interpretation and form of the SLCP analysis results as part of the RAMSS analysis are described in more detail in the RAMSS User's Handbook (reference 1.4.6).

A.4.4 Reporting Results of Evaluation. The SLCP evaluation results are reported as part of the overall RAMSS results. The form of these results is dependent upon AFOTEC reporting requirements. The output from the RAMSS automated support tool forms a basis for the reporting of these results as described in the RAMSS User's Handbook.

A.5 RESPONSE FORM.

a. There is no special response form required for the Software Life Cycle Process evaluation. However, the question response guidelines in attachment A1 are organized so that there is one page for each question, its guidelines for response, pertinent terminology, an evaluator rating, and a rationale for the rating. The Software Test Manager (STM), Deputy for Software Evaluation (DSE) or other designated personnel are encouraged to put a copy of attachment A1 in a separate notebook for each software system under evaluation and use the question guideline page as a permanent record for comments, notes, rationale, and the question score.

b. In order to consolidate the Software Life Cycle Process question responses for entry into the RAMSS data base, the National Computer Systems (NCS) answer sheet used for the Software Product evaluation (AFOTECP 800-2, Volume III) could be used.

A.6 RESPONSE SCALE.

a. To complete the evaluation questionnaire, the evaluator will use the subjective scale of agreement from 1 (completely disagree) to 6 (completely agree). In general, the response scale should be interpreted as follows:

(1) COMPLETELY AGREE (6): There must be absolutely no doubt when using this response that the characteristic being evaluated is totally satisfactory with respect to the characteristic addressed.

(2) STRONGLY AGREE (5): This response indicates that the characteristic being evaluated is very good and is very helpful for software supportability.

(3) GENERALLY AGREE (4): This response indicates that the characteristic being evaluated is satisfactory, but may require improvements to make it helpful for software supportability.

(4) GENERALLY DISAGREE (3): This response indicates that the characteristic being evaluated is unsatisfactory, and some improvements are required to make it helpful for software supportability.

(5) STRONGLY DISAGREE (2): This response indicates that the characteristic being evaluated is unsatisfactory and major improvements are required before it would be helpful for software supportability.

(6) COMPLETELY DISAGREE (1): There must be absolutely no doubt when using this response that the characteristic being evaluated is totally unsatisfactory with respect to the characteristic addressed.

One of these responses should be given for each question. Also, responses 1 or 6 are, in general, not expected, since these responses indicate a worst possible or best possible characteristic relative to software file cycle processes in general.

b. Note that the correspondence with the letters on the National Computer systems (NCS) answer sheet (AFOTECP 800-2, Volume III) is as follows in case that answer sheet is used to consolidate the question responses:

6 = A
5 = B
4 = C
3 = D
2 = E
1 = F

A.7 EVALUATION INFORMATION SOURCES.

The sources of information to determine a response to a question can be categorized in many ways. One convenient categorization is:

(1) Project Documents: Government, Contractor

(2) Regulations, Directives, Guidelines: Internal, Compliance

(3) Personnel: Procurement, Development Contractor, Operation Support, Interface Working Groups.

The primary information sources across these categories are listed in figure A-4. The terminology for some of the questions is based on the DoD-STD-2167 for Defense System Software Development,

Directives, Regulations, Standards

1. DoDD 5000.1, Major System Acquisition, 19 Nov 1985.
2. DoDI 5000.2, Major System Acquisition Procedures, 19 Nov 1985.
3. DoDD 5000.3, Test and Evaluation, 26 Dec 1985 (DRAFT).
4. DoDD 5000.3 M-3, Software Test and Evaluation Manual, Oct 1985.
5. DoDD 5000.29, Management of Computer Resources in Major Systems, 26 Apr 1976 (In Revision).
6. DoDD 5000.31, Higher Order Programming Language (HOL) Standardization Policy for Embedded Computers, 10 Jun 1983.
7. AFR 800-14 Vol. I, Management of Computer Resources in Systems, 12 Sep 1975.
8. AFR 800-14 Vol. II, Acquisition and Support Procedures for Computer Resources in Systems, 26 Sep 1975.
9. AFR 55-43, Management of Operational Test and Evaluation, 28 Jun 1985.
10. AFR 65-3, Configuration Management, 1 Jul 1974.
11. AFR 80-14, Test and Evaluation, 12 Sep 1980.
12. AFR 800-4, Transfer of Program Management Responsibility, 15 Jun 1982.
13. AFSCP 800-48, Software Management Indicators, 9 Dec 1985.
14. AFOTECR 55-1, AFOTEC Operations Regulation, 1 Jun 1985.
15. DoD-STD-2167, Defense System Software Development, 4 Jun 1985.
16. DoD-STD-2168, Software Quality Evaluation, 24 Apr 1985 (DRAFT).

Figure A-4. Information Sources for SLCP Evaluation

17. DoD-STD-480A, Configuration Control - Engineering Changes, Deviations and Waivers, 12 Apr 1978.

18. DoD-STD-482A, Configuration Status Accounting Data Elements and Related Features, 1 Apr 1974.

19. MIL-STD-483A, Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs, 4 Jun 1985.

20. MIL-STD-490A, Specification Practices, 4 Jun 1985.

21. MIL-STD-1521B, Technical Reviews and Audits for Systems, Equipments, and Computer Software, 4 Jun 1985.

22. MIL-S-52799A, Software Quality Assurance Program Requirements, 1 Aug 1979.

23. Joint Regulation, Management of Computer Resources in Defense Systems, 30 Dec 1983 (DRAFT).

24. Joint Regulation, Data Item Descriptions, 4 Jun 1985.

25. TRW Guidebook Series, An Air Force Guide to Computer Program Configuration Management, Aug 1977.

26. POWER System Manager's Manual, 1983.

27. ANSI/IEEE Std 828-1983, Software Configuration Management Plans, 23 Jun 1983.

28. ANSI/IEEE Std 829-1983, Software Test Documentation, 19 Aug 1983.

Project Specific Documents

1. Program Management Directive (PMD)
2. Program Management Plan (PMP)
3. Test and Evaluation Master Plan (TEMP)
4. Computer Resources Life Cycle Management Plan (CRLCMP)

Figure A-4. Information Sources for SLCP Evaluation (Continued)

5. Computer Resources Integrated Support Plan (CRISP)
6. Operational/Support Configuration Management Procedures (O/S CMP)
7. Development Test and Evaluation Plans
8. Operational Test and Evaluation Plans
9. Contractor Computer Program Development Plan (CPDP)
10. Contractor Software Configuration Management Plan (SCMP)
11. Contractor Software Quality Assurance Plan

Figure A-4. Information Sources for SLCP Evaluation (Concluded)

ATTACHMENT A1

SOFTWARE LIFE CYCLE PROCESS QUESTION RESPONSE GUIDELINES

a. The Software Life Cycle Process Questions and Response Guidelines are presented in this attachment. The information for each question is presented on one page and consists of a:

(1) Statement of the evaluation question

(2) Characteristic identification

(3) Applicable activity(ies)

(4) Explanation of the question as appropriate

(5) Glossary of terms as appropriate

(6) Special response instructions (if any)

(7) Response rationale to be completed by the evaluator

(8) Response score to be completed by the evaluator (range is 1 to 6).

The question identification information is at the top right of each page. For example, "SCM(ID) - 001" is question number 001 for the characteristic identification (ID) within the major factor Software Configuration Management (SCM). In addition, each set of characteristic questions (e.g., for Identification) is preceded by a one-page description of the characteristic features.

b. The Software Project Management and Software Configuration Management Guidelines are presented in that order.

ACRONYMS

The following list of acronyms are frequently used in the questions and are summarized here for convenience.

CCB	-	Configuration Change Board
CDR	-	Critical Design Review
CDRL	-	Contract Data Requirements List
CRISP	-	Computer Resources Integrated Support Plan
CRLCMP	-	Computer Resources Life Cycle Management Plan
CRWG	-	Computer Resources Working Group
CSC	-	Computer Software Component
CSCI	-	Computer Software Configuration Item
DID	-	Data Item Description
DT&E	-	Development Test and Evaluation
ECP	-	Engineering Change Proposal
FCA	-	Functional Configuration Audit
FOT&E	-	Final Operational Test and Evaluation
FQT	-	Formal Qualification Test
HIPO	-	Hierarchy, Input, Process, Output
HOL	-	High Order Language
HWCI	-	Hardware Configuration Item
ICWG	-	Interface Control Working Group
IOT&E	-	Initial Operational Test and Evaluation
ISA	-	Instruction Set Architecture
IV&V	-	Independent Verification and Validation
JLC	-	Joint Logistics Commanders
O/S CMP	-	Operational/Support Configuration Management Procedures
PCA	-	Physical Configuration Audit
PDR	-	Preliminary Design Review
PMD	-	Program Management Directive
PMP	-	Program Management Plan
RFP	-	Request for Quote
SCM	-	Software Configuration Management
SCN	-	Specification Change Notice
SDR	-	System Design Review
SON	-	Statement of Need
SOW	-	Statement of Work
SPM	-	Software Project Management
SRR	-	System Requirements Review
TEMP	-	Test and Evaluation Master Plan
TPWG	-	Test Planning Working group
TRR	-	Test Readiness Review
WBS	-	Work Breakdown Structure

SOFTWARE PROJECT MANAGEMENT PLANNING

The questions SPM(PL)-001 through SPM(PL)-032 address adequacy of software project management planning for the procurement, development contractor, and operation support activities. Project management planning is established in the form of technical documentation that becomes more detailed as development proceeds and more refined as the final development products are evolved during post deployment support. Three levels of project planning are generally employed during the software system's life cycle:

(1) Procurement activity project planning
(2) Development Contractor activity project planning
(3) Operation Support activity project planning

The Procurement activity project plans include:
(1) Program Management Plan (PMP)
(2) Test and Evaluation Master Plan (TEMP)
(3) RFP/SOW/CDRL Package
(4) DT&E Plans
(5) OT&E Plans
(6) Computer Resources Life Cycle Management Plan (CRLCMP)
Computer Resources Integrated Support Plan (CRISP)
Operational/Support Configuration Management Procedures (O/S CMP)

The Development Contractor activity project plans include:
(1) Software Development Plan (SDP)
(2) Software Configuration Management Plan (SCMP)
(3) Software Quality Evaluation Plan (SQEP)
(4) Software Standards and Procedures Manual (SSPM)
(5) Software Test Planning
(Plan, Procedures, Description, Acceptance)

The Operation Support activity project plans include:
(1) Computer Resources Life Cycle Management Plan (CRLCMP)
Computer Resources Integrated Support Plan (CRISP)
Operational/Support Configuration Management Procedures (O/S CMP)
(2) Software Configuration Management Plan (SCMP)
(3) Software Support Management Plan (SSMP)
(4) Other Agreements (e.g., Memorandums of Agreement)

The adequacy of software project management planning with respect to the area of software supportability is mostly a matter of procurement requiring software supportability characteristics, development contractor implementing the characterisitics, and operation support transitioning early life cycle concepts and continuing the evolution process through the post deployment life cycle phase.

QUESTION DATA SHEET

Question Number SPM(PL) - 001

QUESTION: Planning for computer resources has been adequate with respect to acquisition, development, logistics, and training.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The primary procurement planning documents include the PMP, TEMP, System/Segment Specification, and CRLCMP (CRISP, O/S CMP). The computer resources includes the hardware, software, personnel, procedures, facilities, schedule, budget, and so forth. All aspects of acquisition, development, logistics support, and training must be planned. The Milestones I, II, and III provide major event check points for analysis and review of plans. Analysis should always be conducted with respect to operational requirements, and the results integrated back into the "living" plans. Plans for measuring software quality attributes, in particular software supportability, are required.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 002

QUESTION: Procurement planning for computer resources has been consistent with the system development and acquisition plan.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The primary system development and acquisition plan is the PMP. The CRLCMP (CRISP,O/S CMP) should be derived from the allocation of the system requirements in the PMP to computer resources. The CRLCMP identifies computer resource acquisition and life cycle support requirements. The CRLCMP reflects the software development and support approach for the system and is evolved as a living document throughout the system life cycle.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 003

QUESTION: Planning for computer resources has been based upon an acquisition schedule with adequately specified milestones.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The plans should be based upon a realisitic acquisition schedule. Major Milestones I, II, and III should be specified as well as the major review and audit points such as SDR, SRR, PDR, CDR, TRR, FCA, PCA. The transition and turnover dates should also realistically reflect the risks in acquiring and supporting such a system. Studies and analysis should have been performed prior to the Full Scale Development effort in order to determine what a realistic schedule should be.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 004

QUESTION: Computer resources have been adequately addressed as major considerations at procurement reviews, audits, and management evaluations.

ACTIVITY(S): All

EXPLANATION: Typical procurement reviews, audits, and management evaluation involve participation of all activities. The degree of participation depends upon the particular event. Feasibility studies. tradeoff analysis, prototype developments, and milestone decision points determine how thoroughly computer resources have been addressed.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 005

QUESTION: Planned computer resources have been analyzed adequately by procurement to ensure conformance with stated operational and support requirements.

ACTIVITY(S): Procurement

EXPLANATION: Methods of analysis include feasibility studies, tradeoff studies, risk analysis, and prototype development. These methods usually occur during Concept Exploration and/or Demonstration and Validation phases prior to the Full Scale Development phase. During Full Scale Development an IV&V function can assist in such analysis.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 006

QUESTION: Procurement planning for software quality attributes has been adequately emphasized throughout the software life cycle acquisition.

ACTIVITY(S): Procurement

EXPLANATION: Software quality attributes should be a major consideration in the initial planning of software requirements. This emphasis should be continued throughout the system and software life cycle phases. Software quality requirements and responsibilities should be defined in the CRLCMP (CRISP, O/S CMP). Procedures should be developed and implemented to ensure proper assessment of computer resources throughout the system life cycle. The procurement activity should develop assessment procedures to ensure that the computer software will meet management policies and appropriate regulations, conform to standards, and meet performance and quality requirements throughout the system life cycle. Computer software should be continuously assessed by means of reviews, audits, verification validation testing, and other enforcement activities.

GLOSSARY:

Software Quality Attributes. Reliability, Supportability, Maturity, Efficiency, and so forth.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 007

QUESTION: Margins for reserve computer resource capacity to provide for later product improvements are adequate.

ACTIVITY(S): All

EXPLANATION: Requirements for margins and the initial values are established by the procurement and operation support activity in the PMD, RFP/SOW, and System/Segment Specification. These margins are then evolved throughout the Full Scale Development by the development contractor activity. Margins should be established for memory, external storage, task utilization, terminal usage, performance parameters, and so forth. Typical guidelines are to leave 30 to 50 percent of the total resource capacity as reserve dependent upon the resource and the particular application. The margin of reserve is very important for software supportability since changes will usually require consumption of some of the reserve.

GLOSSARY:

Margin. The difference between the total available capacity of a resource and the actual amount used.

RESPONSE INSTRUCTIONS:

F/1: 50% or less of required reserve capacity is available for at least one of the resources, or no margin requirements have been established

E/2: 50% to 60% of required reserve capacity is available for at least one of the resources

D/3: 60% to 70% "

C/4: 70% to 80% "

B/5: 80% to 90% "

A/16 90% to 100% of required reserve capacity is available for all resources

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 008

QUESTION: Acceptable techniques have been used to estimate and monitor software costs throughout the system life cycle.

ACTIVITY(S): All

EXPLANATION: It is necessary that a standard technique (e.g.,COCOMO model) be used to estimate software costs throughout the system life cycle. It is probably more important that some technique be consistently used and the results carefully monitored than which technique is used. Each activity should have some method which is used and a way to correlate cost results from the other activities with their results. A cost/schedule risk analysis should be done at each of the major project life cycle decision points. The software costs are usually related to the related WBS tasks in order to accomplish the cost/schedule risk analysis.

GLOSSARY:

COCOMO. Constructive Cost Model (B. Boehm of TRW)

Software Cost. The resources consumed to develop and support software throughout its life cycle.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

<u>QUESTION:</u> The CRLCMP (CRISP, O/S CMP) contains adequate specifications of the acquisition requirements for computer resources.

<u>ACTIVITY(S):</u> Procurement and Operation Support

<u>EXPLANATION:</u> During the development phase, the CRLCMP (CRISP,O/S CMP) serves to define the development plan and to identify the computer resources necessary to support the system after deployment. After the system has been deployed, the CRLCMP serves to define the plan for managing the support of the system's computer resources. The procurement activity should begin preparing the CRLCMP with the help of the operation support activity, with completion no later than Milestone II or equivalent. At this point the CRLCMP should focus on plans for developing the computer resources, including computer resources needed for system support. As the system progresses into the Full Scale Development phase, the CRLCMP should be expanded to provide a comprehensive plan for support of computer resources. By Milestone III or equivalent, the CRLCMP should contain a plan for transitioning computer resource responsibilities from the procurement activity to the operation support activity.

<u>GLOSSARY:</u>

<u>RESPONSE_INSTRUCTIONS:</u>

<u>RESPONSE_RATIONALE:</u>

<u>RESPONSE_SCORE:</u> ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 010

QUESTION: The CRLCMP (CRISP, O/S CMP) adequately addresses the responsibilities and prodedures to ensure proper software configuration management throughout the system life cycle.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: Responsibilities should be defined in the CRLCMP (CRISP, O/S CMP) and procedures should be developed and implemented to ensure proper control of computer resources throughout the system life cycle in accordance with AFR 65-3. Computer hardware and software should be identified, specified, and managed as configuration items. The mechanism for controlling computer hardware and software changes is the documentation for each configuration item, and it is the responsibility of the system configuration manager within the procurement or operation support activity to ensure that this documentation is accurate and current. The Configuration Control Board (CCB) should be the primary authority for approving hardware and software changes throughout the system life cycle. Membership on the CCB should be determined by the procurement and/or the operation support activity in accordance with the provisions of AFR 65-3.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 011

QUESTION: The project management responsibility for integrating computer resources into a system has remained centralized throughout the life of the system.

ACTIVITY(S): All

EXPLANATION: The minimum requirement is that each activity's project management responsibility remain with the same organizational element. For example, the implementing command, development contractor, using command, and supporting command remain the same. A more important aspect of the centralization is that the lower level organization structure (including personnel) within each activity should remain intact without fragmentation or major variance of responsibility over all life cycle phases.

GLOSSARY:

Centralized. Located within the same organizational element.

RESPONSE INSTRUCTIONS:

F/1: 0% to 50% of the project management across all activities and all phases has remained centralized

E/2: 50% to 60% "

D/3: 60% to 70% "

C/4: 70% to 80% "

B/5: 80% to 90% "

A/6: 90% to 100% "

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 012

QUESTION: The CRWG organization has been adequate throughout the system life cycle.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: If not already established during the Concept Exploration phase, the CRWG should be formed early in the Demonstration and Validation phase to assist the program manager in planning and implementing software issues, activities, and functions. During acquisition, the implementing command chairs and manages the CRWG. The CRWG should also include the using command, supporting command, and perhaps representatives of other organizations responsible for DT&E, OT&E and training.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 013

QUESTION: The CRWG has had clearly specified responsibilities and appropriate authority to implement those responsibilities throughout the system life cycle.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The CRWG supports the program manager in developing the CRLCMP (CRISP). Also, the CRWG recommends alternatives in areas such as documentation requirements, software security requirements, IV&V, standard equipment, standard HOLs, standard ISAs, and margins for reserve computer capacity. The CRWG identifies the computer resources and facilities required to support the system throughout the system life cycle. For programs with interservicing potential, the CRWG includes members from each organization affected by interservicing. The CRWG analyzes interservicing potential to support the program manager's decision concerning a joint service facility. This analysis should consider operational needs, life cycle costs, technical capability, and service-unique standards for computer resources. Without the proper authority to implement its decisions and have its recommendations acted upon, the CRWG will be deficient.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 014

QUESTION: The CRWG has properly assured that computer resources comply with established policy, procedures, plans, and standards.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The CRWG assists in ensuring that computer resources comply with established policy, procedures, plans, and standards. The CRWG continuously supports the procurement activity in planning the computer resource life cycle and evaluating developed computer resources. The CRWG recommends updates to the CRLCMP (CRISP) to ensure that acquisition, user, and support requirements are satisfied. The CRWG evaluates computer software plans, products, and proposed changes to ensure compatibility with the CRLCMP (CRISP) and consistency with policies and procedures. The CRWG also supports the procurement activity in the resolution of issues such as documentation requirements and support agreements. If computer resources development is part of an interservice program, then the interservice CRWG verifies that the required computer resources and operation support capabilities are available to support the system. Before Milestone III or equivalent, the CRWG should develop interservice procedures for operation support of the system. In addition, the CRWG ensures that the joint service operation support activity participates in the Full Scale Development phase, thereby acquiring the necessary familiarity and experience to support the system upon completion of development.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 015

QUESTION: Software quality assessment procedures have been adequately defined to meet management policies and appropriate regulations, conform to standards, and meet performance and quality requirements throughout the system life cycle.

ACTIVITY(S): All

EXPLANATION: Software quality requirements and responsibilities shall be defined in the CRLCMP (CRISP). Procedures should be developed and implemented to ensure proper assessment of computer resources throughout the system life cycle. The procurement activity develps assessment procedures to ensure that the computer software will meet management policies and appropreate regulations, conform to standards, and meet performance and quality requirements throughout the system life cycle. Computer software should be continuously assessed by means of reviews, audits, verification validation testing, and other enforcement activities. The primary software quality regulations/standards are MIL-S-52799A and the more recent DoD-STD-2168.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 016

QUESTION: Planning for DT&E of computer resources has been adequate throughout the system life cycle.

ACTIVITY(S): Procurement

EXPLANATION: The primary high level planning document for DT&E is the TEMP. DT&E descriptions in the TEMP should concentrate on technical goals, thresholds, and objectives. At each review phase, the essential questions should continue to be whether objectives were met, degree of confidence in results, and specific system behaviour leading to observed anomalies. The detailed DT&E plans supplement the TEMP and provide insight into the specific software and system integration tests and procedures which are planned.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 017

QUESTION: Planning for OT&E of computer resources has been adequate throughout the system life cycle.

ACTIVITY(S): Procurement

EXPLANATION: The primary high level planning document for OT&E is the TEMP. More detailed OT&E plans supplement the TEMP. The types of OT&E are IOT&E and FOT&E. IOT&E is the first test of a complete system and support elements in an operational environment. IOT&E provides an early over-the-shoulder effort during the Demonstration and Validation phase of the system life cycle. The purpose of the early IOT&E is to provide an operational input to the initial development program, assure the coupling of requirements to the development program, develop an interface between developer and user, and refine operational issues for subsequent test and evaluation. After go-ahead for Full Scale Development, a later IOT&E is conducted prior to the production decision. FOT&E is conducted when the system is fully deployed in order to assess full system capability. Specific objectives, subobjectives, and measures of effectiveness should be addressed in the OT&E planning documents.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 018

QUESTION: Software standards have been adequately specified throughout the software life cycle.

ACTIVITY(S): All

EXPLANATION: The RFP/CDRL/SOW reflect required software standards as specified by the procurement activity. The standards should apply to all aspects of the software development and support. Typical standards are DoD-STD-2167, DoDO-STD-2168, MIL-STD-483A, MIL-STD-1521B, DoD-STD-1815A, and various ANSI/IEEE software engineering standards. The development contractor must comply with the procurement requirements through internal standards and conventions. The operation support activity contributes to the recommendations on the use of required standards and sets internal standards and conventions for use during the post deployment support of the software.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 019

QUESTION: The planning for organic and/or contractor support during post deployment software support has been adequate.

ACTIVITY(S): Operation Support

EXPLANATION: Software supportability characteristics include software product maintainability, software support resources, and software life cycle processes. Plans for organic and/or contractor support and the evaluation of whether such support will be adequate relative to software supportability characteristics should be contained in the CRLCMP (CRISP, O/S CMP).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 020

QUESTION: Contractual documents have explicitly established Government rights to all computer resources required to develop, operate, simulate, test, and support the software.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: Contractual documents should clearly establish government rights to all computer resources required to support the software. The rights may have proprietary clauses which must be carefully understood by all parties. The application software, system software, and test software should be considered.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 021

QUESTION: Planning for risk analysis to identify areas of computer resource risk has been adequate.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: A common source of operational software problems is the difficulty of maintaining and supporting the sortware once it is deployed. The technology used to design and implement the software may significantly affect this ability. Danger signals may include the use of proprietary tools and techniques that will not be available to engineers after system delivery. Alternatively, there may be unique aspects of the design effort that positively affect subsequent life cycle cost and effort. One approach to reducing long-term life cycle risks is to enforce the use of common technology throughout the development and operation of the software. It is not uncommon for the project office to supply tools and support software to the development contractor to ensure commonality. However, care should be exercised to avoid Government liability in cases of inadequate Government furnished tools. Ideally, life cycle characteristics of operational significance should be listed as required characteristics of the system and tests should be planned to address the issues that arise from these characteristics.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 022

QUESTION: A mission/function matrix (or equivalent) clearly identifies primary functional capabilities to be implemented by the software.

ACTIVITY(S): Procurement and Operational Support

EXPLANATION: A mission/function matrix (or equivalent narrative) is the primary source of information about how the system capabilities have been partitioned between hardware and software. These partitions will be important in determining required characteristics, in defining error/failure criteria, and in isolating and correcting deficiencies noted during testing. Therefore, it may be important to determine that proper engineering studies have led to the establishment of these partitions. An understanding of the sources of risk in each of the software-implemented functions identified in the mission/function matrix is an essential part of the overall risk assessment.

GLOSSARY:

Mission/Function Matrix. Correspondence relating primary functional capabilities that must be demonstrated by testing to the mission to be performed and the concept of operation.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 023

QUESTION: Planning for interoperability with other systems has been adequately addressed.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: When required, systems must be interoperable with other systems employed by the U.S. and Allied military forces. Interoperability requirements should be identified, defined, validated, and included in appropriate planning documentation prior to the end of the Demonstration and Validation phase. Both development and post deployment support concerns should be addressed, and organizational responsibilities defined.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: No interoperability requirements exist for the subject system

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 024

QUESTION: Prior to each system milestone, interservicing potential and life cycle cost implications of software support options, have been appropriately addressed.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: Before each system milestone, interservicing potential should be reviewed and the management and life cycle cost implications of major software support options should be analyzed. This analysis should also consider impact on operational needs, configuration management, and system integration. For interservice systems, the CRWG should be an interservice CRWG that includes representatives from all cognizant organizational elements. The CRWG (interservice or single service) should ensure that analysis is performed to determine the optimum support approach, document this analysis, and make recommendations to the procurement activity concerning the support approach.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 025

QUESTION: The procurement and operation support planning documents have been adequately updated as living documents throughout the system life cycle.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: Some of the documents which should be continually updated include the TEMP, CRLCMP (CRISP, O/S CMP), and the DT&E and OT&E plans. It is important that these documents are working plans and as such track closely the progress and current status of the system.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 026

QUESTION: The principles and methodologies provided in the regulations have been appropriately incorporated into the software test and evaluation plans.

ACTIVITY(S): All

EXPLANATION: Typical procurement and operation support regulations include DoD 5000.3, DoDD 5000.29, DoDD 5000.31, AFR 800-14 (Vols I and II), AFR 80-14, and AFR 55-43. Typical development contractor compliance regulations include DoD-STD-2167, DoD-STD-2168, MIL-STD-1521B, MIL-S-52799A (to be superceded by DoD-STD-2168). The software test and evaluation plans are primarily contained in the TEMP, DT&E plans, OT&E plans, IV&V plans, and development contractor plans.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 027

QUESTION: Planning for systematic, quantitative, and objectively reportable software tests has been adequate.

ACTIVITY(S): ALL

EXPLANATION: It should be apparent from the description of the software tests conducted and their results whether or not previous goals have been met and test objectives have been satisfied. Vague references to "successful software results" or "no problems with the software" should not be acceptable. In order to evaluate the progress of software testing to date, there must be explicit reference to: 1) a systematic, scientifically sound approach to carrying out the test, 2) the relationship between the systematic test approach and the test objectives for the current phase, 3) the results of the test, and 4) the plans for resolution of errors.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: _________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 028

QUESTION: Planning for sharing of software test results across lifecycle phases and among test organizations has been adequate.

ACTIVITY(S): All

EXPLANATION: DoDD 5000.3 requires involvement and data sharing across all life cycle phases for test organizations: DT&E, OT&E, IV&V and the development contractor. The TEMP is the primary high level planning document for software test and evaluation with appropriate references to all the organizational elements' plans. The development contractor activity is responsible for developing test plans and procedures to effect an appropriate sharing (as defined contractually in the SOW) of test results.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 029

QUESTION: Tracking of computer resource utilization has been adequately planned.

ACTIVITY(S): All

EXPLANATION: The procurement activity must plan to have tracking data collected. This plan is put into action through appropriate contract requirements. The development contractor must plan to implement data collection procedures which satisfy the contractual requirements as a minimum. Normally more detailed data must be collected by the development contractor in order to properly derive the required contract data and adequately manage the development effort. Typical data to be collected includes memory, central processing unit usage, and input/output throughput. The maximum and minimum values and actual resource utilization data values are required. This data is necessary to determine if required margins of reserve will be met. See AFSCP 800-48 for more information.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 030

QUESTION: The project software budget/cost variance (budgeted - actual) appears to be reasonable.

ACTIVITY(S): All

EXPLANATION: Depending upon the perspective, all activities are required to adequately manage the software budget/cost. At each major management review for the activity, the variance between what was budgeted and what has actually been consumed should be analyzed. Based upon the known contractual changes in requirements an assessment should be made whether the variance in cost is within certain limits. The limits should probably be established during the Demonstration and Validation phase through a risk analysis. See AFSCP 800-48 for more information.

GLOSSARY:

Budget/Cost Variance. The budgeted cost of software task work (WBS) performed minus the actual cost of software task work performed.

Percentage Variance. The Budget/Cost Variance divided by the actual cost of software task work performed times 100.

RESPONSE INSTRUCTIONS:

F/1: plus or minus 25% or more Percentage Variance
E/2: plus or minus 20% to 25% Percentage Variance
D/3: plus or minus 15% or 20% Percentage Variance
C/4: plus or minus 10% or 15% Percentage Variance
B/5: plus or minus 5% or 10% Percentage Variance
A/6: plus or minus 0% or 5% Percentage Variance

Underruns can be as big an indicator of a problem as an overrun, but each case should be carefully considered on its own merits.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 031

<u>QUESTION:</u> The project software schedule/cost variance (consumed - scheduled) appears to be resonable.

<u>ACTIVITY(S):</u> All

<u>EXPLANATION:</u> Depending upon the perspective, all activities are required to adequately manage the software schedule/cost. At each major management review for the activity, the variance between what was consumed and what has actually been scheduled should be analyzed. Based upon the known contractual changes in requirements an assessment should be made whether the variance in cost is within certain limits. The limits should probably be established during the Demonstration and Validation phase through a risk analysis. See AFSCP 800-48 for more information.

<u>GLOSSARY:</u>

<u>Schedule/Cost Variance.</u> The budgeted cost of software task work (WBS) performed minus the budgeted cost of software task work scheduled.

<u>Percentage Variance.</u> The Schedule/Cost Variance divided by the actual cost of software task work performed times 100.

<u>RESPONSE INSTRUCTIONS:</u>

F/1: plus or minus 25% or more Percentage Variance
E/2: plus or minus 20% to 25% Percentage Variance
D/3: plus or minus 15% or 20% Percentage Variance
C/4: plus or minus 10% or 15% Percentage Variance
B/5: plus or minus 5% or 10% Percentage Variance
A/6: plus or minus 0% or 5% Percentage Variance

Schedule decreases can be as big an indicator of a problem as increases, but each case should be carefully considered on its own merits.

<u>RESPONSE RATIONALE:</u>

<u>RESPONSE SCORE:</u> ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PL) - 032

QUESTION: The cost and schedule contractual reporting requirements appear to be adequate.

ACTIVITY(S): All

EXPLANATION: The data necessary to determine the cost variance and schedule variance information in questions SPM(PL)-030 and SPM(PL)-031 are a minimum requirement. AFSCP 800-48 provides further information. DoDI 7000.2 is the policy for financial management reporting for the development contractor activity (appropriate size and types of contracts). AFSCP 173-5 implements the policy of DoDI 7000.2 and provides specific criteria for the development contractor activity.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE PROJECT MANAGEMENT ORGANIZATION STRUCTURE

The questions SPM(OS)-001 through SPM(OS)-019 address adequacy of software project management organization structure for the procurement, development contractor, and operation support activities. Project management organization structure is established so that the functional requirements of a project can be more effectively accomplished. This organization structure includes the physical relationship among the organization elements, the logical structure which relates the organization elements to the project's functional requirements, and the stability and capability of the personnel which staff the organization.

Characteristics which affect the organization structure are number of internal interfaces, size of organization, stability of the physical structure, continuity and capability of project personnel, and capability of the physical organization to effectively handle responsibilities inherent in the software project work breakdown structure tasks.

QUESTION DATA SHEET

Question Number SPM(OS) - 001

QUESTION: The software requirements have been adequately allocated to elements of a Work Breakdown Structure (WBS).

ACTIVITY(S): All

EXPLANATION: The WBS should clearly indicate those task areas where software related requirements are addressed. A traceability matrix should clearly indicate how those requirements have been mapped to the WBS elements. All activities (procurement, development contractor, operation support) are involved in some aspect of the WBS, software requirements, and the allocation process.

GLOSSARY:

Software Requirements. Contractual system requirements which have been allocated to software functions. Usually found in a system/segment specification and/or a functional development specification.

Work Breakdown Structure. Product-oriented hierarchical definition of all tasks to be performed and accounted for in the course of the project development.

RESPONSE INSTRUCTIONS:

F/1: No WBS exists, no software requirements specification exists, and/or there is no evidence of an allocation of software requirements to WBS elements.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SPM(OS) - 002

QUESTION: The software related tasks are clearly identified in the WBS.

ACTIVITY(S): All

EXPLANATION: Typical software tasks include project management, development, documentation, test, environment evolution, configuration management, quality assurance, acceptance, and transfer. All software related tasks should be separately identified from hardware related tasks as much as is possible. The more accurately such tasks can be tracked and reported, the more likely early problem areas can be identified and resolved.

GLOSSARY:

Software Task. Project task whose primary function is related to the production and/or delivery of a software product.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 003

QUESTION: The key project personnel and their assignments in relation to the WBS software related tasks are clearly identified.

ACTIVITY(S): All

EXPLANATION: In order to properly identify responsibilities and communication channels it is necessary to have the key project personnel for all activities identified along with their areas of responsibility and their relationship to the WBS.

GLOSSARY:

Key Project Personnel. Project managers, task managers, task technical leaders for all activities.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 004

QUESTION: The coordination of modifications to the WBS among all activities has been adequate.

ACTIVITY(S): All

EXPLANATION: Whenever the WBS is modified there is potential to have a significant effect upon all activities. This effect may be in the form of a modification in schedule, level of effort, deliverable product, functional capability, and/or system interface. A mechanism to coordinate such changes is necessary in order to make sure all potentially effected parties are properly consulted. Without such a mechanism, changes can be made without such consultation or perhaps without being properly reflected in the WBS.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 005

QUESTION: The procurement personnel staffing has had continuity throughout the software life cycle phases.

ACTIVITY(S): Procurement

EXPLANATION: The staffing continuity is determined by the rate of turnover of personnel during and across the life cycle phases. If the same personnel (or at least a reasonable ratio of the same personnel) are not available from phase to phase, then there is likely to be a perturbation in the schedule, cost, functional requirements, and quality of the deliverable products. Turnover of key personnel should be minimal with no sharp variations. See AFSCP 800-48 for more information.

GLOSSARY:

Continuity. Lack of turnover and sharp change in personnel staff.

RESPONSE INSTRUCTIONS:

F/1: 50% or more turnover during or between any one phase: (Concept, Demonstration, Development, Deployment)
E/2: 40% to 50% turnover during or between any one phase
D/3: 30% to 40% turnover during or between any one phase
C/4: 20% to 30% turnover during or between any one phase
B/5: 10% to 20% turnover during or between any one phase
A/6: 0% to 10% turnover during or between all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 006

QUESTION: The ratio of experienced procurement project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Procurement

EXPLANATION: One key to developing and supporting software is to have experienced personnel, especially in the key leadership positions. Experience with the subject system, similar systems, technologically similar problems, the management problems of similar systems, and the interfaces with the subject system results in better managed, higher quality software products. Experienced personnel also shorten the learning curve for less experienced personnel. See AFSCP 800-48 for more information.

GLOSSARY:

Experienced Personnel. Personnel who have an extensive historical perspective of the subject system and its software requirements, as well as the technical expertise and/or management expertise required to efficiently implement the required software solutions.

RESPONSE INSTRUCTIONS:

F/1: 10% or less experienced personnel during any one phase (Concept, Demonstration, Development, Deployment)
E/2: 10% to 20% experienced personnel during any one phase
D/3: 20% to 30% experienced personnel during any one phase
C/4: 30% to 40% experienced personnel during any one phase
B/5: 40% to 50% experienced personnel during any one phase
A/6: 50% or more experienced personnel during all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 007

QUESTION: The number of procurement personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Procurement

EXPLANATION: The number of personnel should be sufficient to support the responsibilities required by the program. Sufficient number is dependent upon matching the experience, workload, and productivity requirements. Typically, fewer persons are required during the concept phase, more persons during the demonstration and then development phases, and gradually fewer persons prior to the deployment phase of the project. One method of determining "sufficient" is to assume the allocated number of personnel is the most optimum, and determine the ratio of actual to allocated personnel. Guidelines for an evaluation response based on this ratio are given below. See AFSCP 800-48 for more information.

GLOSSARY:

Number of Procurement Personnel. The count of personnel directly responsible for procurement functions relative to the subject system. This includes direct software project management, technical staff, and support staff. Only those staff positions directly allocated, or through direct assignment of an allocated position, should be considered. If necessary, a "full time equivalent" (e.g., part of a position which is shared among one or more other systems) value can be used.

RESPONSE INSTRUCTIONS:

F/1: 0% to 50% of allocated load during any life cycle phase (Concept, Demonstration, Development, Deployment)
E/2: 50% to 60% of allocated load during any life cycle phase
D/3: 60% to 70% of allocated load during any life cycle phase
C/4: 70% to 80% of allocated load during any life cycle phase
B/5: 80% to 90% of allocated load during any life cycle phase
A/6: 90% or more of allocated load during all life cycle phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 008

QUESTION: The development contractor personnel staffing has had continuity throughout the software life cycle phases.

ACTIVITY(S): Development Contractor

EXPLANATION: The staffing continuity is determined by the rate of turnover of personnel during and across the life cycle phases. If the same personnel (or at least a reasonable ratio of the same personnel) are not available from phase to phase, then there is likely to be a perturbation in the schedule, cost, functional requirements, and quality of the deliverable products. Turnover of key personnel should be minimal with no sharp variations. See AFSCP 800-48 for more information.

GLOSSARY:

Continuity. Lack of turnover and sharp change in personnel staff.

RESPONSE INSTRUCTIONS:

- F/1: 50% or more turnover during or between any one phase: (Concept, Demonstration, Development, Deployment)
- E/2: 40% to 50% turnover during or between any one phase
- D/3: 30% to 40% turnover during or between any one phase
- C/4: 20% to 30% turnover during or between any one phase
- B/5: 10% to 20% turnover during or between any one phase
- A/6: 0% to 10% turnover during or between all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 009

QUESTION: The ratio of experienced development contractor project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Development Contractor

EXPLANATION: One key to developing and supporting software is to have experienced personnel, especially in the key leadership positions. Experience with the subject system, similar systems, technologically similar problems, the management problems of similar systems, and the interfaces with the subject system results in better managed, higher quality software products. Experienced personnel also shorten the learning curve for less experienced personnel. See AFSCP 800-43 for more information.

GLOSSARY:

Experienced Personnel. Personnel who have an extensive historical perspective of the subject system and its software requirements, as well as the technical expertise and/or management expertise required to efficiently implement the required software solutions.

RESPONSE INSTRUCTIONS:

F/1: 10% or less experienced personnel during any one phase (Concept, Demonstration, Development, Deployment)
E/2: 10% to 20% experienced personnel during any one phase
D/3: 20% to 30% experienced personnel during any one phase
C/4: 30% to 40% experienced personnel during any one phase
B/5: 40% to 50% experienced personnel during any one phase
A/6: 50% or more experienced personnel during all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 010

QUESTION: The number of development contractor personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Development Contractor

EXPLANATION: The number of personnel should be sufficient to support the responsibilities required by the program. Sufficient number is dependent upon matching the experience, workload, and productivity requirements. Typically, fewer persons are required during the early requirements phase, more persons during the design and implementation phases, and gradually fewer persons prior to the production phase of the project. There are few good guidelines as to what is "sufficient" for a development contractor. The use of cost estimation equations as proposed in the literature (e.g., B. Boehm's COCOMO model) is possible, but not very simple to apply. One guideline is to make sure sharp increases or decreases in the number of personnel do not occur. See AFSCP 800-48 for more information.

GLOSSARY:

Number of Development Contractor Personnel. The count of personnel directly responsible for development contractor functions relative to the subject system. This includes direct software project management, technical staff, and support staff. Only those staff positions directly assigned should be considered. If necessary, a "full time equivalent" (e.g., part of a position which is shared among one or more other systems) value can be used.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 011

QUESTION: The operation support personnel staffing has had continuity throughout the software life cycle phases.

ACTIVITY(S): Operation Support

EXPLANATION: The staffing continuity is determined by the rate of turnover of personnel during and across the life cycle phases. If the same personnel (or at least a reasonable ratio of the same personnel) are not available from phase to phase, then there is likely to be a perturbation in the schedule, cost, functional requirements, and quality of the deliverable products. Turnover of key personnel should be minimal with no sharp variations. See AFSCP 800-48 for more information.

GLOSSARY:

Continuity. Lack of turnover and sharp change in personnel staff.

RESPONSE INSTRUCTIONS:

F/1: 50% or more turnover during or between any one phase: (Concept, Demonstration, Development, Deployment)
E/2: 40% to 50% turnover during or between any one phase
D/3: 30% to 40% turnover during or between any one phase
C/4: 20% to 30% turnover during or between any one phase
B/5: 10% to 20% turnover during or between any one phase
A/6: 0% to 10% turnover during or between all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 012

QUESTION: The ratio of experienced operation support project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Operation Support

EXPLANATION: One key to supporting software is to have experienced personnel, especially in the key leadership positions. Experience with the subject system, similar systems, technologically similar problems, the management problems of similar systems, and the interfaces with the subject system results in better managed, higher quality software revisions. Experienced support personnel also shorten the learning curve for less experienced support personnel. See AFSCP 800-48 for more information.

GLOSSARY:

Experienced Personnel. Personnel who have an extensive historical perspective of the subject system and its software requirements, as well as the technical expertise and/or management expertise required to efficiently implement modifications to the delivered software products.

RESPONSE INSTRUCTIONS:

F/1: 10% or less experienced personnel during any one phase (Concept, Demonstration, Development, Deployment)
E/2: 10% to 20% experienced personnel during any one phase
D/3: 20% to 30% experienced personnel during any one phase
C/4: 30% to 40% experienced personnel during any one phase
B/5: 40% to 50% experienced personnel during any one phase
A/6: 50% or more experienced personnel during all phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 013

QUESTION: The number of operation support personnel has been adequate throughout the software life cycle phases.

ACTIVITY(S): Operation Support

EXPLANATION: The number of personnel should be sufficient to support the responsibilities required by the program. Sufficient number is dependent upon matching the experience, workload, and productivity requirements. Typically, fewer operation support persons are required during the concept phase, more persons during the demonstration and then development phases, and maximum personnel during the deployment phase of the project. One method of determining "sufficient" is to assume the allocated number of personnel is the most optimum, and determine the ratio of actual to allocated personnel. Guidelines for an evaluation response based on this ratio are given below. See AFSCP 800-48 for more information.

GLOSSARY:

Number of Operation Support Personnel. The count of personnel directly responsible for operation support functions relative to the subject system. This includes direct software project management, technical staff, and support staff. Only those staff positions directly allocated, or through direct assignment of an allocated position, should be considered. If necessary, a "full time equivalent" (e.g., part of a position which is shared among one or more other systems) value can be used.

RESPONSE INSTRUCTIONS:

- F/1: 0% to 50% of allocated load during any life cycle phase (Concept, Demonstration, Development, Deployment)
- E/2: 50% to 60% of allocated load during any life cycle phase
- D/3: 60% to 70% of allocated load during any life cycle phase
- C/4: 70% to 80% of allocated load during any life cycle phase
- B/5: 80% to 90% of allocated load during any life cycle phase
- A/6: 90% or more of allocated load during all life cycle phases

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 014

QUESTION: The internal interfaces among procurement organization elements have been adequate.

ACTIVITY(S): Procurement

EXPLANATION: Internal organization elements might include the program office, configuration management organization, development test and evaluation agency, operational test and evaluation agency, independant verification and validation organization, and various interservice elements as appropriate. Characteristics of the interfaces to be assessed include proper decision process information flow, effectiveness of information flow, and adherence to regulations and guidelines for interface responsibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 015

QUESTION: The internal interfaces among development contractor organization elements have been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: Internal organization elements might include the project management, configuration management group, project technical staff, hardware and software groups, quality assurance group, independent test group, contract management, and corporate management. Characteristics of the interfaces to be assessed include proper decision process information flow, effectiveness of information flow, and adherence to regulations and guidelines for interface responsibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 016

QUESTION: The internal interfaces among operation support organization elements have been adequate.

ACTIVITY(S): Operation Support

EXPLANATION: Internal organization elements might include the project management, configuration management group, project technical staff, hardware and software groups, quality assurance group, independent test group, contract management, and supporting and using command management. Characteristics of the interfaces to be assessed include proper decision process information flow, effectiveness of information flow, and adherence to regulations and guidelines for interface responsibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 017

QUESTION: The procurement physical organization structure has been adequate.

ACTIVITY(S): Procurement

EXPLANATION: The project physical structure is typically represented in an organization chart. The physical organization should have a logical relationship to the project WBS, with the specific physical organization elements having a well-defined functional responsibility for a part of the WBS. The software parts of the physical structure should be clearly identified and adequate to accomplish the responsibilities inherent in the WBS.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

F/1: No physical organization chart or equivalent is available, or it is not current.

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 018

QUESTION: The development contractor physical organization structure has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The project physical structure is typically represented in an organization chart. The physical organization should have a logical relationship to the project WBS, with the specific physical organization elements having a well-defined functional responsibility for a part of the WBS. The software parts of the physical structure should be clearly identified and adequate to accomplish the responsibilities inherent in the WBS.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No physical organization chart or equivalent is available, or it is not current.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(OS) - 019

QUESTION: The operation support physical organization structure has been adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The project physical structure is typically represented in an organization chart. The physical organization should have a logical relationship to the project WBS, with the specific physical organization elements having a well-defined functional responsibility for a part of the WBS. The software parts of the physical structure should be clearly identified and adequate to accomplish the responsibilities inherent in the WBS.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No physical organization chart or equivalent is available, or it is not current.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE PROJECT MANAGEMENT DESIGN METHODS

The questions SPM(DM)-001 through SPM(DM)-018 address adequacy of software project management design methods for the procurement, development contractor, and operation support activities. Project management design methods are established so that the functional requirements of a project can be more efficiently transcribed into an implemented product. The design methods include standards, conventions, regulations, directives, software language, review methods, high level representation techniques and methodologies, automated design aids, and so forth.

There are generally two aspects of a design method which need to be evaluated. First, does the design method facilitate production of high quality software within limited available resources? Second, can the design method be transitioned to the software support activity for the evolution of the software products during post deployment support?

The procurement activity is responsible for assuring that adequate design methods have been required through the PMP, CDRL, SOW, and any other procurement documents. The procurement activity is also responsible for understanding the nature and importance of the development contractor design methods and the effects which software design tradeoffs might have upon the effective implementation of the desired system. The procurement activity should have its own methods of assessing whether system requirements and design specifications of those requirements are consistent, and whether the design adequately implements the requirements.

The development contractor activity is responsible for establishing design standards appropriate for the software being developed so that an operationally effective and supportable system is produced. Design representation techniques and automated design aids should be appropriate for development of the software design in an efficient manner and for transition to the operation support activity.

The operation support activity is responsible for making sure the development contractor is required to use design methods which can be effectively used during post deployment support. Such design methods may require training for the support activity personnel. The operation support activity also has the responsibility to assure that the support environment is to be supplied with all the necessary design aids to effectively accomplish software support.

QUESTION DATA SHEET

Question Number SPM(DM) - 001

QUESTION: The procurement design analysis studies have provided adequate design guidelines for the development contractor.

ACTIVITY(S): Procurement

EXPLANATION: Design analysis studies include feasibility studies on the use of computer resources, tradeoff studies concerning programming language and instruction set architecture selections, alternate approaches for implementing security requirements, alternate approaches for achieving operational interoperability, and investigations of support concepts and environments. These studies are usually part of the Concept Exploration and Demonstration and Validation life cycle phases. The design guidelines which result range from specification of language and operational computer of choice to a working prototype of the complete system.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 002

QUESTION: The standards for software design required by the procurement activity are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The standards minimally include development contractor software development regulations such as DoD-STD-2167, DoD-STD-2168, MIL-STD-483A, MIL-STD-490A, and MIL-STD-1521B. Generally the RFP/CDRL/SOW will indicate minimal software design standards and the related Data Item Desriptions will indicate the format and content of the resulting design specifications.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 003

__QUESTION:__ The software design methodology used by the development contractor is adequate.

__ACTIVITY(S):__ Development Contractor

__EXPLANATION:__ Typical design methodologies include approaches for life cycle events, personnel allocation by function, support resource management, and schedule/budget analyses. The life cycle approach might be top down, iterative refinement, waterfall, prototype, or some combination. The personnel allocation by function method may prescribe use of design-only, code-only, integrate-only, test-only, management-only personnel. Or, it may prescribe personnel groups which handle some combination of these functions. Support resource management could include specification of the resources such as requirements analysis tool, structured analysis design tool, automated tools for specification generation and translation to PDL and implemented source code. Simulators for design specifications and use of formal verification languages are other possible aspects of design methodology. The use of techniques such as hierarchy diagrams, HIPOs, N by N Charts, data flow diagrams, and so forth are important for representing the design and are the foundation of specific design methods.

__GLOSSARY:__

__RESPONSE INSTRUCTIONS:__

__RESPONSE RATIONALE:__

__RESPONSE SCORE:__ _________
(COMPLETELY DISAGREE 0,1,2,3,4,5,6 COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 004

QUESTION: The design standards and methods adopted for use by the operation support activity during post deployment software support are adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The operation support activity should adopt design standards and methods consistent with internal site product support standards and also consistent with the design standards and methods used by the development contractor. The CRLCMP (CRISP, O/S CMP) should include information concerning the design methods selected.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 005

QUESTION: The System Design Review process has been adequate.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The objective of the System Design Review (SDR) is to formally assess the allocated system requirements before proceeding with the preliminary design of the computer hardware and software configuration items. The SDR should include review of the detailed system-level design and the allocation of system functions to individual hardware and software configuration items. The SDR should include evaluation of the optimization, traceability, completeness, and risks associated with the allocated technical requirements. A successful SDR will be predicated on the determination that the System Specification is an adequate basis for developing computer hardware and software configuration items.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

QUESTION DATA SHEET

Question Number SPM(DM) - 00?

QUESTION: The software requirements appear to be reasonable.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The software requirements are initially derived at the functional level from procurement documents such as the Statement of Need, Program Management Directive, Program Management Plan, and eventually the System/Segment Specification (A-spec). The software requirements must be an integrable, well-defined part of the overall system requirements, and it must be clear what the relationship is among the software requirements and the system mission functions. Whether the software requirements are reasonable depends upon: the total number of requirements; the technology necessary to implement the requirements and associated functionality in software; the schedule and budget for development and support; and the environmental considerations of software personnel skills, interface requirements to the system, parallel hardware/software development requirements, and the system's functional mission.

GLOSSARY:

Software Requirement. A functional need which is described in the system documentation and allocated to software for implementation.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 007

<u>QUESTION:</u> The number of software requirements which cannot be traced to an end item product is minimal.

<u>ACTIVITY(S):</u> All

<u>EXPLANATION:</u> Procurement is responsible for the initial identification and partial allocation of software requirements to functional end item components in the System/Segment Specification (Functional Baseline). The operation support activity has a responsibility to assist in the definition of this Functional Baseline from the user and supporter viewpoints. The development contractor activity is responsible for continuing the software allocation process from the high level functional description completely through to the low-level software modules and routines. It should be possible to trace each software requirement all the way down to the set of modules and routines which implement the requirement, and to the specific test suite which verifies and validates the requirement. All requirements should be traceable to the CSCI level at the conclusion of preliminary design phase. See AFSCP 800-48 for more information.

<u>GLOSSARY:</u>

<u>End Item.</u> An implemented unit which is not decomposed further for purposes of identification. For procurement purposes, the usual end item is a CSCI. For development contractor purposes (and related unit, component, and integration testing), the end item may be the routine. The end item to consider will also depend upon the software development phase.

<u>RESPONSE INSTRUCTIONS:</u>

General Guideline. For some systems 90% requirements traceability will be a low risk, for other systems it may be a high risk. Fuzzy indicators are if 15% to 20% of the requirements are not traceable, then the software development is a medium to high risk of compromising the desired mission goals. A more specific set of guidelines is:

F/1: 0% to 50% traceability to an end item appropriate to phase
E/2: 50% to 60% traceability to an end item appropriate to phase
D/3: 60% to 70% traceability to an end item appropriate to phase
C/4: 70% to 80% traceability to an end item appropriate to phase
B/5: 80% to 90% traceability to an end item appropriate to phase
A/6: 90% to 100% traceability to an end item appropriate to phase

<u>RESPONSE RATIONALE:</u>

<u>RESPONSE SCORE:</u> ________

[illegible] 1 2 3 4 5 6 (COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 008

QUESTION: The number of software requirements which cannot be tested are minimal.

ACTIVITY(S): All

EXPLANATION: In the derivation of requirements it is the responsibility of all activities to specify, at the appropriate level of specification, software requirements in a way such that tests can be defined to verify and validate that the software requirements have been met. The requirements may include a tolerance range of possible outcomes, a minimum/maximum absolute value, a subjective rating of a feature, or a domain/range of hardware and software outcomes. Although it is not necessary to specify test criteria to know whether a software requirement is testable, it is the best way to make sure there is no misinterpretation of whether a software requirement has passed or failed a test. See AFSCP 800-48 for more information.

GLOSSARY:

RESPONSE INSTRUCTIONS:
General Guideline. For some systems 90% requirements testability will be a low risk, for other systems it may be a high risk. Fuzzy indicators are if 15% to 20% of the requirements are not testable, then the software development is a medium to high risk of compromising the desired mission goals. A more specific set of guidelines is:

F/1: 0% to 50% requirements have testable specifications
E/2: 50% to 60% requirements have testable specifications
D/3: 60% to 70% requirements have testable specifications
C/4: 70% to 80% requirements have testable specifications
B/5: 80% to 90% requirements have testable specifications
A/6: 90% to 100% requirements have testable specifications

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 009

QUESTION: The profile of changes to software requirements is reasonable.

ACTIVITY(S): Procurement and Development Contractor

EXPLANATION: The number of change actions (e.g., ECPs) which impact the software requirements, the severity/criticality of the changes, and the number of such changes opened/closed over a given time period determine what the change profile is. This profile will generally have a higher number of changes early in the development, decreasing with occasional upward spikes to very few changes near the end of development. Too many changes which impact requirements, changes which are extremely severe, changes which are open for a long time, and erratic increases and decreases in the unresolved actions are indicative of potential problems. Change requests result from action items which are derived during informal and formal project reviews. See AFSCP 800-48 for more information.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 010

QUESTION: The profile of unresolved software review action items is reasonable.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: Unresolved (open) software review action items result from informal and formal software design reviews. Unresolved action items are expected to spike upward at each review and then exhibit exponentially decreasing behaviour. Programs that issue clearly written specifications will experience spikes that are lower. Programs with good communicatin will have a higher rate of exponential decay. The count of unresolved software review action items must be maintained by the program office as well as the development contractor. See AFSCP 800-48 for more information.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 011

QUESTION: The development contractor requirements analysis process has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: A complete set of functional and performance requirements must be established for each CSCI. The requirements analysis accomplished during the Demonstration and Validation phase, and subsequent requirements validation, must continue during the Full Scale Development phase to completely define the requirements. Interface requirements must be defined between CSCIs and HWCIs. All adaptations needed to accommodate different user sites must be identified. Requirements analysis must evaluate requirements for completeness, consistency, adequacy, testability, understandability, and supportability. As mission needs change, additional analyses may be required to determine the impact on software requirements.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 012

QUESTION: The development contractor top level design process has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: A modular top-level software design should be developed from the software requirements. The preliminary design process should consider various design alternatives, analytical results, trade-off studies, and capability to accommodate change. The design should identify computer software components (CSCs) and define the data interfaces, control flow, and resource budgets for memory and execution time at the CSC level. Functional software requirements should be assigned to CSCs of the top-level design. An initial data base design should define structure and organization of the data base. The design of formal and informal tests should be developed and documented in the software plan for testing compliance of each CSCI with each applicable software and interface requirement. The preliminary design process culminates with the Preliminary Design Review conducted by both procurement and the development contractor activities, and monitored by the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 013

QUESTION: The development contractor detailed design process has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The detailed software design process should refine the CSCs of the top-level software design to successively lower-level design elements until, at the lowest level, they specify individual units to be developed. The detailed design should define all information required for coding these units, including control logic, algorithms, data, accuracy, and timing. For any interfaces with other CSCIs or HWCIs, detailed interface design should precisely define data formats, data flow, and timing constraints in sufficient detail for coding data structures and control routines. The data base design should be defined, including its constituent items, fields, records, and files. The detailed software test design should define the methods and criteria of conducting the individual tests previously identified in the Software Test Plan. Each test case should be designed in terms of inputs, expected results, and evaluation criteria (e.g., pass/fail). The test descriptions form the basis for subsequent development of test procedures. Descriptions of formal tests should require procurement activity approval. The detailed design process culminates with the Critical Design Review conducted by both the procurement and the development contractor activities, and monitored by the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 014

QUESTION: The design completion of CSCIs relative to the software life cycle development schedule has been reasonable.

ACTIVITY(S): Development Contractor

EXPLANATION: The rate at which a development contractor completes CSCI designs may vary depending upon the software development method selected. A prototype method may allow for some CSCIs to be completely coded before other CSCIs are even designed. The design completion criteria may thus be somewhat subjective and should be tailored to the particular system. Generally, the response guidelines should reflect adequate considerations of system life cycle phases and software development methodology being used. See AFSCP 800-48 for more information.

GLOSSARY:

Design Completion. CSCI has satisfactorily completed its detailed design specification (C-spec).

Design Deficiency. (Number of CSCIs planned for design completion minus the number of CSCIs actually designed) divided by the (number of CSCIs planned for design completion) all times 100.

RESPONSE INSTRUCTIONS:

F/1: 50% to 100% design deficiency
E/2: 40% to 50% design deficiency
D/3: 30% to 40% design deficiency
C/4: 20% to 30% design deficiency
B/5: 10% to 20% design deficiency
A/6: 0% to 10% design deficiency

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 015

QUESTION: The development contractor monitor of the subcontractor software design process has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: Any subcontractors to the prime development contractor who have software development responsibilities should be required to apply design standards and methods consistent with the prime contractor's required standards and methods. The prime contractor has ultimate responsibility to the procurement activity for delivery of quality software, hence subcontractor efforts in this area must be carefully monitored and reviewed, much as the procurement activity monitors and reviews the development contractor software development effort.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: There are no subcontractors with software development responsibilities

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 016

QUESTION: The design specifications for the software products contain adequate information to implement the software with the required functionality and within the schedule and budget requirements.

ACTIVITY(S): All

EXPLANATION: The design specifications include the System/Segment Specification, the top-level design specification, the detailed design specifications, interface specifications, data base design specifications, and the test design specifications. The design specifications should adequately capture the transformation of requirements into a paper representation of the software solution, sufficiently precise to directly implement the software.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 017

QUESTION: The operation support concept for design of software revisions during post deployment software support is adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The operation support concept should include design methods, top-level and detailed design process approaches, and test design methods. This concept should be consistent with the concept used by the development contractor.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(DM) - 018

QUESTION: The operation support concept for design review during post deployment software support is adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The operation support concept should include preliminary and detailed design reviews as part of the software block release process. The reviews should be consistent with those used during Full Scale Development, probably at a somewhat reduced scope, proportionate to the extensiveness of the changes in the block release and how much the software design has been affected by the changes.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE PROJECT MANAGEMENT IMPLEMENTATION METHODS

The questions SPM(IM)-001 through SPM(IM)-016 address adequacy of software project management implementation methods for the procurement, development contractor, and operation support activities. Project management implementation methods are established so that the design specifications of a project can be more efficiently transcribed into an implemented product. The implementation methods include standards, conventions, regulations, directives, software language, review methods, low level representation techniques and methodologies, automated implementation aids, and so forth.

There are generally two aspects of an implementation method which need to be evaluated. First, does the implementation method facilitate production of high quality software within limited available resources? Second, can the implementation method be transitioned to the software support activity for the evolution of the software products during post deployment support?

The procurement activity is responsible for assuring that adequate implementation methods (e.g., coding standards, desk check procedures) have been required through the PMP, CDRL, SOW, and any other procurement documents. The procurement activity is also responsible for understanding the nature and importance of the development contractor implementation methods and the effects which software implementation tradeoffs might have upon the desired system. The procurement activity should have its own methods of assessing whether software design and the implementation of that design are consistent, and whether the implementation is an adequate reqpresentation of the design.

The development contractor activity is responsible for establishing and using implementation standards appropriate for the software being developed so that an operationally effective and supportable system is produced. Implementation representation techniques and automated implementation aids should be appropriate for coding and integrating the software in an efficient manner and for transitioning the techniques and aids to the operation support activity.

The operation support activity is responsible for making sure the development contractor has requirements to use implementation methods which can be effectively used during post deployment support. Such methods may require training for the support activity personnel. The operation support activity also has the responsibility to assure that the software development environment is delivered with all the necessary impementation aids to effectively accomplish software support.

QUESTION DATA SHEET

Question Number SPM(IM) - 001

QUESTION: The procurement activity has adequately monitored the implementation of the software design specifications.

ACTIVITY(S): Procurement

EXPLANATION: The time gap between the end of the major detailed design phase (Critical Design Review) and the beginning of system integration testing as signaled by the Test Readiness Review can be significant. It is necessary for the procurement activity to carefully monitor development contractor implementation progress through status reports, informal reviews, site visits, interim demonstrations, and the required software baseline change process.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 002

QUESTION: The procurement test organization interface with the development contractor is adequate enough to assure success of the system integration tests.

ACTIVITY(S): Procurement and Development Contractor

EXPLANATION: The primary test organizations are the DT&E agency, the OT&E agency, and possibly an IV&V organization. The system integration test success is directly dependent upon the implementation progress of the development contractor. The operational test process also has such dependency. The IV&V (if any) will generally provide for supplementary testing which provides greater assurance that the implementation is all right and/or identifies problem areas which decrease assurance and lengthen the implementation phase.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 003

QUESTION: The operation support activity has been actively involved with the development contractor's software implementation in order to learn the software prior to officially accepting software support responsibility.

ACTIVITY(S): Operation Support

EXPLANATION: All through the full scale development the operation support activity should monitor the progress of the development contractor's software development. During the implementation phase (latter part) some key operation support activity personnel should begin to actively learn the software design, implementation, integration, and test. This may take the form of formal course training and hands on software modification to informal observations of the development contractor process.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: There are no plans for operation support personnel to actively participate in the software modification process prior to PMRT.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 004

QUESTION: The standards for software implementation required by the procurement activity are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The standards minimally include development contractor software development regulations such as DoD-STD-2167, DoD-STD-2168, MIL-STD-483A, MIL-STD-490A, and MIL-STD-1521B. Generally the RFP/CDRL/SOW will indicate minimal software implementation standards and the related Data Item Desriptions will indicate the format and content of the resulting implementation specifications.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 005

QUESTION: The implementation methodology used by the development contractor is adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: Typical implementation methodologies include approaches for life cycle events, personnel allocation by function, support resource management, and schedule/budget analyses. The life cycle approach might be top down, iterative refinement, waterfall, prototype, or some combination. The personnel allocation by function method may prescribe use of design-only, code-only, integrate-only, test-only, management-only personnel. Or, it may prescribe personnel groups which handle some combination of these functions. Support resource management could include specification of the resources such as requirements analysis tool, structured analysis design tool, automated tools for specification generation and translation to PDL and implemented source code. Simulators for design specifications and use of formal verification languages are other possible aspects of implementation methodology. The use of techniques such as code walkthroughs, simulation, symbolic debug, static code analysis, automated test case generators, regression testing are are the foundation of code/unit test/integration implementation methods.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 006

QUESTION: The implementation standards and methods adopted for use by the operation support activity during post deployment software support are adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The operation support activity should adopt implementation standards and methods consistent with internal site product support standards and also consistent with the implementation standards and methods used by the development contractor. The CRLCMP (CRISP, O/S CMP) should include information concerning the implementation methods selected.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 007

QUESTION: The development contractor monitor of subcontractor software implementation process has been adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: Any subcontractors to the prime development contractor who have software development responsibilities should be required to apply implementation standards and methods consistent with the prime contractor's required standards and methods. The prime contractor has ultimate responsibility to the procurement activity for delivery of quality software, hence subcontractor efforts in this area must be carefully monitored and reviewed, much as the procurement activity monitors and reviews the development contractor software development effort.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: There are no subcontractors with software development responsibility

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 008

QUESTION: The implementation completion of CSCIs has been reasonable relative to the software life cycle schedule.

ACTIVITY(S): Development Contractor

EXPLANATION: The rate at which a development contractor completes CSCI implementations may vary depending upon the software development method selected. A prototype method may allow for some CSCIs to be completely tested before other CSCIs are even designed. The implementation completion criteria may thus be somewhat subjective and should be tailored to the particular system. Generally, the response guidelines should reflect adequate considerations of system life cycle phases and software development methodology being used. See AFSCP 800-48 for more information.

GLOSSARY:

Implementation Completion. Implementation of a CSCI is complete when the CSCI has satisfactorily completed its integration testing.

Implementation Deficiency. (Number of CSCIs planned for implementation completion minus the number of CSCIs actually implemented) divided by the (number of CSCIs planned for implementation completion) all times 100.

RESPONSE INSTRUCTIONS:

F/1: 50% to 100% implementation deficiency
E/2: 40% to 50% implementation deficiency
D/3: 30% to 40% implementation deficiency
C/4: 20% to 30% implementation deficiency
B/5: 10% to 20% implementation deficiency
A/6: 0% to 10% implementation deficiency

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 009

QUESTION: The procurement software project management support tool environment is adequate.

ACTIVITY(S): Procurement

EXPLANATION: During the Concept Exploration and Demonstration and Validation phases, the necessary automated tools and procedures for procurement project management (software and hardware) should be identified, developed, and/or acquired. The tool environment should allow for budget and schedule management, mission requirements tracing, product deliverable status tracking, configuration management change status tracking, and management information communication capabilities among participating organizations. A current list of required tools, function of each tool, date required, and date acquired should be maintained.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 010

QUESTION: The development contractor software project management support tool environment is adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The development contractor activity is required to provide certain management information on the project status to the procurement activity. Automated project management tools are available to assist these software project management functions. The DoD-STD-2167 and its associated Data Item Descriptions, as called out in the CDRL, have specific requirements for development contractor data collection and reporting.

GLOSSARY:

RESPONSE INSTRUCTIONS:
If no automated project management tools are being used, then the response should be less than C/4.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 011

QUESTION: The development contractor software configuration management support tool environment is adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: Software configuration management is one of the most important management functions performed by the development contractor. Frequently the amount of information to be retained, analyzed, and reported is very large. Thus, an automated support tool environment to assist this process is essential. Such a tool must be supplemented with adequate management procedures. Such a tool environment must be must have the capability to efficiently report on all software components under configuration control, current and planned changes to those components, and planned components not currently under control. Library management of software (specifications, source, object, command language, load modules, test data, etc.) and the capability to automatically reconstruct current and previous versions of software components is required.

GLOSSARY:

RESPONSE INSTRUCTIONS:

If no automated project management tools are being used, then the response should be less than C/4.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 012

QUESTION: The development contractor system software tool environment is adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The precise configuration of a system development tool environment will vary somewhat depending upon the particular application and the complexity of the software development effort.

GLOSSARY:

System Software Tool. Operating system, compiler, linker, debugger, data base manager, methodology support tool, requirements generation tool, host system, and so forth.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 013

QUESTION: The development contractor application software test environment is adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The test environment tool set is critical for thorough unit testing and laboratory integration testing. The maturity of the software will largely depend upon how completely the software can be tested.

GLOSSARY:

Application Software Test Environment. Software bench, target machine, laboratory integrated test bed, specialized test devices and instrumentation, special security facilities, simulators and emulators, and so forth.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 014

QUESTION: The operation support software support tool environment is adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The software support tool environment is one of the critical factors for software supportability. The software revisions must be developed, configuration controlled, and tested in a manner similar to the original Full Scale Development effort.

GLOSSARY:
Software Support Tool Environment. The systems of the Software Support Resources. Includes the system development software tool environment and the application software test tool environment as required by the support environment.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 015

QUESTION: The operation support concept for implementation of software revisions during post deployment software support is adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The operation support concept should include coding style guidelines, methods for assuring code correctness (e.g., quality assurance metrics, code desk checks) prior to unit test, unit and integration test methods, and operational test methods. The concept should include an overall software support plan which delineates how software releases are to be project and configuration managed. This plan is an internal detailed specification derived from the more high level CRLCMP (CRISP, O/S CMP).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(IM) - 016

QUESTION: The operation support concept for implementation audits and reviews during post deployment software support is adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The review of implemented revisions has some parallel with the reviews and audits in the development process. However, the reviews tend to be less extensive. A Test Readiness Review should be conducted on the revised software baseline prior to operational testing of each block release. Informal reviews, small scale functional and physical configuration audit/reviews for configuration baseline update integrity, and the test readiness review constitute the audits and reviews pertinent to the implementation phase of a block release.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________

COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

SOFTWARE PROJECT MANAGEMENT TEST STRATEGIES

The questions SPM(TS)-001 through SPM(TS)-020 address adequacy of software project management test strategies for the procurement, development contractor, and operation support activities. Software test strategies are established so that the implemented product can be verified and validated against the requirement specifications. The test strategies include standards, conventions, regulations, directives, test languages, verification and validation methods, test generation and representation techniques and methodologies, automated test aids, and so forth. Key to a reasonable test strategy is the generation of a test plan, test descriptions, test procedures, test reports, demonstration tests, configuration management of test information, and transition of test strategy to the operation support activity.

There are generally two aspects of a test strategy which need to be evaluated. First, does the test strategy facilitate production of high quality software within limited available resources? Second, can the test strategy be used by the software support activity for the evolution of the software products during post deployment support?

The procurement activity is responsible for assuring that adequate test methods have been required or are planned through the PMP, CDRL, SOW, TEMP, DT&E and OT&E test plans, and any other procurement documents. The procurement activity is also responsible for understanding the nature and importance of the development contractor test strategies and the effects which various testing techniques might have upon the verification and validation of the desired system. The procurement activity is responsible for making sure the DT&E, OT&E, IV&V, and development contractor test strategies are consistent and are complementary. The procurement activity should have its own methods of assessing whether software requirements have been adequately verified and validated, and the amount and type of testing which is still required to achieve an operational capability.

The development contractor activity is responsible for establishing test standards appropriate for the software being developed so that an operationally effective and supportable system is produced. Test plans, techniques, schedules, and automated aids should be appropriate for thorough test of the software implementation and system integration. The test techniques, test cases, and test environment should be designed for transition to the operation support activity.

The operation support activity is responsible for making sure the development contractor is required to use a test strategy which can be effectively used during post deployment support. The operation support activity also has the responsibility to assure that the post deployment software support test strategy is consistent with the development contractor's test strategy.

QUESTION DATA SHEET

Question Number SPM(TS) - 001

QUESTION: The TEMP adequately describes the software test and evaluation process.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The software test and evaluation process includes objectives, measures of effectiveness, organization responsibilities and interfaces, the DT&E and OT&E specific test interfaces, and the overall schedule and funding level of the test process. Any use of IV&V by procurement should be described along with the organization relationships and expected results. The TEMP is a concise desciption of the complete system test process, but there should be adequate attention to the software test process, and appropriate reference to other planning documents for more detailed information.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: The TEMP does not exist or does not address software test and evaluation

RESPONSE RATIONALE:

RESPONSE SCORE: ________
COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 002

QUESTION: The software test process for DT&E has followed the guidelines in the TEMP.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The TEMP reflects top level input from the DT&E organization and should be followed if the TEMP is to be an important, high level planning document. Characteristics to be considered include schedule, planning and utilization of resources, derivation of high level measures of effectiveness for the specified objectives and subobjectives, and the communication of test results with other test organizations.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: The TEMP does not exist or does not address software DT&E

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 003

QUESTION: The software test process for OT&E has followed the guidelines in the TEMP.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The TEMP reflects top level input from the OT&E organization and should be followed if the TEMP is to be an important, high level planning document. Characteristics to be considered include schedule, planning and utilization of resources, derivation of high level measures of effectiveness for the specified objectives and subobjectives, and the communication of test results with other test organizations.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: The TEMP does not exist or does not address software OT&E

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 004

QUESTION: The implementation of the software test process by DT&E and OT&E organizations has been adequate.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The TEMP guidelines for the software test process should reflect the DT&E and OT&E approaches. The actual implementation of those guidelines is specified in the DT&E and OT&E organizations' plans. Check the effectiveness of the tests to stress the software components in a thorough manner. The assurance the tests provide that the software requirements have been verified at a low level of detail and validated in an operationally representative environment is one measure of how mature the software is likely to be during early post deployment support.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: The DT&E and OT&E organizations do not have any specific software test plans

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 005

QUESTION: The test organizations have incorporated a strategy in their software test processes for coordination and sharing of test plans, procedures, and results.

ACTIVITY(S): All

EXPLANATION: The test and evaluation directives require participation of the various test organizations (e.g., DT&E, OT&E, IV&V) across the complete system life cycle. In addition, the requirement is that these organizations coordinate their activities so as to be more effective and thorough. Thus, DT&E results should feed the OT&E process; the requirements of the OT&E process should affect the DT&E process; the IV&V process and results should not duplicate, but complement and supplement the DT&E, OT&E, and development contractor testing process. The development contractor testing process should be an integral part of the DT&E process and monitored closely by the OT&E agency and operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SPM(TS) - 006

QUESTION: The requirements for the development contractor software test strategy are clearly specified in the RFP, SOW, and/or CDRLs.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The best way to achieve a good contractor test strategy is to require one. The best way to do this is through the RFP, SOW, and the CDRLs. The form, methods, techniques, schedule, deliverables, transition, and so forth for the development contractor test strategy should be specified as part of the contractual requirements.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No requirement for a development contractor software test strategy is contractually specified, or what is specified is totally inadequate.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 007

QUESTION: The use of an organization for software test IV&V support has been effective.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The IV&V function is not always required or appropriate. For mission critical systems with significant software it is usually required. The software IV&V may be separate from or a part of a system IV&V effort. For IV&V to be effective it must usually be applied early in the software life cycle and comprise a significant (e.g., 10 TO 30 percent) portion of the software development cost. There are specific instances where IV&V can be used to solely support DT&E and/or OT&E in their specific functions, in which case the IV&V function is less comprehensive and costly. This can be an especially effective way to obtain detailed software stress testing and evaluation which might not be done because of a shortage of test organization support personnel.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No IV&V function has been defined, but the system is a mission critical system with significant software functions.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 008

QUESTION: The overall planning for software testing has been adequate.

ACTIVITY(S): All

EXPLANATION: The combination of procurement, development contractor, and operation support software test planning should reflect an integrated strategy for accomplishing the software test process throughout the software's complete life cycle. The various activities' test plans should identify and emphasize those aspects of primary responsibility. In particular, such plans should identify test items, features to be tested, features not to be tested, relationship of the test items to the baseline being tested and the functional system requirements, test approach and methodologies employed, pass/fail criteria, specific test tasks (WBS), test environment, test responsibility and resource requirements, and test schedules. The test plan, test descriptions, test log, test results, incidence reports, and any other test documentation to be produced should be described in the software test plans.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 009

QUESTION: The software test approach and methodologies employed are clearly described in the software test docmentation and appear to be effective.

ACTIVITY(S): All

EXPLANATION: The approach should be described for each major group of features to be tested. The major activities, techniques, and tools which are to be used should be described in enough detail to identify major testing tasks and estimation of the time required to do each one. The minimum degree of completeness should be specified along with the techniques (e.g., path coverage, statement coverage, domain space coverage) used to judge completeness. Acceptance criteria (e.g., fault frequency) should be specified as well as testing constraints such as test-item availability, test resource availability, schedule deadlines, and funding levels. Testing techniques include code reviews, structure analysis, static program quality analysis, dynamic path analysis, coverage analysis, assertion checking, symbolic debugging, mutation testing, and regression testing. Such techniques can be applied with varying success across the test phases of design verification, unit and module test, CSCI and system integration test, PQT/FQT, system test, and mission test. Application of testing techniques across test phases and descriptions of how the overall test objectives are to be achieved should be clearly specified in the test documentation.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 010

QUESTION: The software features to be tested and not to be tested are clearly described in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should identify features to be tested, features not to be tested, and all combinations of such features across the test cases.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: Software test documentation does not identify features to be tested and not tested.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 011

QUESTION: The traceability of software features tested/not tested to the software functional requirements is described in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should provide assurance of which functional requirements of the software have/have not been satisfied. A clear association of the functional requirements with the software features and the related tests is a major step toward providing that assurance. Typically, a matrix or written description is provided. Use of a cross reference among data dictionaries for requirements, features, and tests is another way such information can be presented.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No cross reference exists among software features. test cases, and functional requirements

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 012

QUESTION: The software test deliverables are adequately specified in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should provide a complete list and description of all software test deliverables. A software test plan is the most logical location for such information. It should also be clearly stated how the deliverables relate to the CDRLs/DIDs in the case of the development contractor.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 013

QUESTION: The software test criteria used to determine whether each test has passed or failed is clearly specified in the software test documentation.

ACTIVITY(S): A11

EXPLANATION: The software test documentation should provide pass/fail criteria for each test and each software feature to be tested. The criteria should be as objective as possible. Examples of criteria include percentage of statements tested, percentage of logic paths tested, and faults (frequency, number of critical/non-critical) allowed.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: 50% or more of the tests/features have inadequate criteria
E/2: 40% to 50% of the tests/features have inadequate criteria
D/3: 30% to 40% of the tests/features have inadequate criteria
C/4: 20% to 30% of the tests/features have inadequate criteria
B/5: 10% to 20% of the tests/features have inadequate criteria
A/6: 0% to 10% of the tests/features have inadequate criteria

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 014

QUESTION: The personnel groups responsible for the software tests are adequately identified in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should clearly identify personnel groups who are responsible for the various software tests across all the test phases. In some cases the individual programmer will be responsible, in other cases a complete independent test group may be responsible. Responsiblities include managing, designing, preparing, executing, monitoring, checking, resolving anomalies, and acceptance/approval. A software test plan is the most likely source of this information, although individual test case descriptions are also a possible source.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: 50% or more tests have no responsible group identified
E/2: 40% to 50% tests have no responsible group identified
D/3: 30% to 40% tests have no responsible group identified
C/4: 20% to 30% tests have no responsible group identified
B/5: 10% to 20% tests have no responsible group identified
A/6: 0% to 10% tests have no responsible group identified

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 015

QUESTION: The high risk assumptions of the software testing approach along with contingency plans for each such assumption is adequately described in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should clearly identify any areas of high risk. Examples of high risk tests include those cases which would require interagency (e.g., interservice) allocation of resources such as test ranges, equipment, or personnel for which the availability is scarce. A schedule delay in such a test might cause a large ripple effect, not only in the subject system test schedule, but in the test schedule of systems competing for the same test resources. Alternate plans for handling such difficulties (resource availability, funding level, technical problems) should be described. A software test plan is the most likely source for identifying the high risk test cases and high level contingency plans. The individual test case description would probably provide more detail as to why the test case is high risk.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: 50% or more of the high risk tests have no contingency plan, or high risk tests exist but are not identified
E/2: 40% to 50% of the high risk tests have no contingency plan
D/3: 30% to 40% of the high risk tests have no contingency plan
C/4: 20% to 30% of the high risk tests have no contingency plan
B/5: 10% to 20% of the high risk tests have no contingency plan
A/6: 0% to 10% of the high risk tests have no contingency plan

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 016

QUESTION: The schedule for software test milestones is adequately specified in the software test documentation.

ACTIVITY(S): All

EXPLANATION: The software test documentation should clearly identify the milestones for each test. These milestones are normally part of the software test plan/approach, the Software Project Schedule which is a subpart of the system WBS schedule, or the system development schedule. The test milestones and their relationship to the overall software and system development schedule should be specified.

GLOSSARY:

Test Milestones. Completion of design, preparation, execution, resolution of anomalies, documentation, acceptance are typical milestones.

RESPONSE INSTRUCTIONS:

- F/1: 50% or more of the software tests have no milestone schedule
- E/2: 40% to 50% of the software tests have no milestone schedule
- D/3: 30% to 40% of the software tests have no milestone schedule
- C/4: 20% to 30% of the software tests have no milestone schedule
- B/5: 10% to 20% of the software tests have no milestone schedule
- A/6: 0% to 10% of the software tests have no milestone schedule

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 017

QUESTION: Software testing is adequately prioritized in the software test approach according to mission criticality concerns.

ACTIVITY(S): All

EXPLANATION: The software test approach should prioritize the software testing process according to mission critical features. For example, if certain software features are critical to the mission reliablity of the system or perhaps the safety of the system personnel, then those features should receive a higher priority. Higher priority features may require more rigorous tests, more objective measures of test assurance, longer test schedule, and a more visible test reporting process.

GLOSSARY:

Mission Critical Feature. Any feature of the system which will prevent the completion of the mission objective or impacts the safety of the the personnel who are part of the mission if it is not developed correctly .

RESPONSE INSTRUCTIONS:

F/1: No prioritization of tests is apparent from the software documentation, or the defined prioritization is not being followed

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SPM(TS) - 018

QUESTION: The software test environment is adequately identified in the software test documentation and is adequate for accomplishing the required testing.

ACTIVITY(S): All

EXPLANATION: The software test documentation should identify the software test environment including host emulation/simulation, software bench testing equipment, integrated laboratory environments, and operational mission test environments.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No identification of the software test environment is documented, or the environment is totally inadequate

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 019

QUESTION: The configuration management of the software test process is adequate.

ACTIVITY(S): All

EXPLANATION: All activities have some responsibility for software test and evaluation. As such, each activity has a responsibility for its particular emphasis to maintain appropriate configuration management of the test process and its documentation. In particular, the procurement DT&E and OT&E test plans, approaches, descriptions, and results should be under tight configuration management. Likewise, the development contractor's software test documentation should be a contract deliverable, perhaps as a CSCI depending upon the criticality of the software. The operation support software test documentation should be carefully controlled throughout the post deployment support of the software.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No configuration management of the software test process and its documentation has been planned

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(TS) - 020

QUESTION: The transition of the software test strategy from the development contractor to the operation support activity has been adequately addressed in the software test documentation and the procurement software test plans.

ACTIVITY(S): All

EXPLANATION: The transition of as much of the software test strategy as possible must be planned from the contract requirements through the program management responsibility transfer. From the procurement PMP, TEMP, CRLCMP (CRISP, O/S CMP), RFP, and CDRLs through development contractor and operation support activity software test planning, the transition must be integrated as a critical part of the software deliverable for supportability purposes.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No transition of the development contractor software test plan, test cases, test approach, or test tools is documented

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

SOFTWARE PROJECT MANAGEMENT PROJECT INTERFACES

The questions SPM(PI)-001 through SPM(PI)-016 address adequacy of software project management external interfaces among the procurement, development contractor, operation support , and interservice organization elements as is appropriate. These project management interfaces are established so that project information can be more efficiently communicated. These interfaces include the physical relationship among the organization elements, and the high level logical relationship of the organization elements to the project's functional requirements.

There are generally two types of interfaces which are important to evaluate for any project: internal organization interfaces, and organization interfaces across external boundaries. The project interface evaluation primarily focuses on how well the external interfaces and basic project organization to support those interfaces for each major organization component facilitate production of a high quality software product.

Characteristics which should be evaluated are the number of external interfaces, size of interface organizations, various working groups' interfaces, and application of directives and regulations to control the coordination among interfacing organizations. Typical interface working groups include the Computer Resources Working Group (CRWG), the Test Planning Working Group (TPWG), and the Interface Control Working Group (ICWG).

QUESTION DATA SHEET

Question Number SPM(PI) - 001

QUESTION: The system program office external interfaces are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The program office interfaces with the implementing command, the using command, the supporting command, the training command, the test and evaluation agencies for DT&E and OT&E, special government contract service agencies such as The MITRE Corporation, and the development contractor. These external interfaces generally are concerned with Air Force policy, adherence to regulations and directives, interservice implications of the system under development, general computer resource management issues, and resource (personnel, systems, time, funds) planning and use. The program manager is the primary head of the program office and must insure that the program office works with the various commands and agencies to establish the means to implement the system acquisition dictated in the PMD and described in the PMP. These interfaces help to define the technology constraints on the system and its software, including what advanced computer technology will be required to be applied. The initial emphasis on software supportability would be in the PMP.

GLOSSARY:

Program Office. An Air Force procuring activity, headed by a program manager, and established within a product division (e.g., Aeronautical Systems Division) early in the demonstration and validation phase for the purpose of fulfilling the program management responsibilities described in the system PMD.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 002

QUESTION: The implementing command external interfaces are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The implementing command works with the program office to make sure the PMP addresses proper development issues, and with the supporting and using commands to assure that the operational and support issues are properly addressed. If there is a development IV&V function, then the implementing command will interface with the IV&V contractor/agency to assure proper coordination among the program office and the development contractor activity. The implementing command is the primary contract monitor and technical reviewer of the development contractor activity tasks. The implementing command project program manager must help to define the technology constraints on the system and its software, including what advanced computer technology will be required to be applied. The implementing command also participates in working groups such as the CRWG, ICWG, and TPWG. The initial emphasis on software supportability would be in the PMP.

GLOSSARY:

Implementing Command. The command responsible for acquisition of a system: development, operation, and maintenance till transfer of program management to the supporting command at PMRT and turnover of the system operation to the using command sometime prior to PMRT. The implementing command is usually AFSC or a MAJCOM.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 003

QUESTION: The using command external interfaces are adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The using (operating) command has the responsibility of operational deployment of a system, subsystem, or item of equipment. The using command has external interfaces with the supporting command, implementing command, program office, and working groups. During the acquisition of the system to be operated, the using command's primary interface role is as monitor to assist in deriving the system requirements necessary to make the system operationally effective. During the post deployment software support, the using command interfaces with the supporting command and various working groups concerning software block releases.

GLOSSARY:

Using Command. The command (or commands and contractor support) responsible for the operational employment of the acquired system usually just prior to PMRT.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 004

QUESTION: The supporting command external interfaces are adequate.

ACTIVITY(S): Operation Support

EXPLANATION: The supporting command external interfaces include: the program office, implementing command, using command, working groups (CPWG, ICWG, TPWG) as appropriate. The primary functions of the interfaces are to assure that the system as delivered is supportable and that appropriate support environment is acquired for use during post deployment support.

GLOSSARY:

Supporting Command. The command (or commands and contractor support) responsible for the configuration management, logistics support, and other kinds of direct support required by a system during operational use. Official responsibility is assumed from the development contractor activity at PMRT.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 005

QUESTION: The training command external interfaces are adequate.

ACTIVITY(S): Procurement and Operation Support

EXPLANATION: The training command reviews system documents and initiates training support planning and evaluation as appropriate, and provides and administers training programs to support systems. The interfaces for such training could include: implementing, using, supporting commands; the DT&E and OT&E agencies.

GLOSSARY:

Training Command. The command (e.g., HQ-ATC) responsible for providing planning, evaluation , conduct, and administration of training programs and training requirements.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 006

QUESTION: The development contractor external interfaces are adequate.

ACTIVITY(S): Development Contractor

EXPLANATION: The development contractor primary external interfaces are with the program office, implementing command, test and evaluation agencies (DT&E, OT&E, IV&V), supporting command, using command, and working groups as is appropriate. The major function of the interfaces are communication of development requirements and status, conduct of integration and operational tests, and transfer of the developed system to the operation support activity.

GLOSSARY:

Development Contractor. The prime contractor and any subcontractors responsible for the full scale development of the software system.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 007

QUESTION: The Development Test and Evaluation (DT&E) organization external interfaces are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The implementing command is responsible for DT&E management. The development contractor and the implementing command jointly conduct the early part of DT&E. The specifics of the DT&E management is documented in the TEMP. DT&E data must be provided to the OT&E agency. Some of the functions of the interfaces are to communicate evaluation of contract specifications, system/software deficiencies, interoperability capability, and estimates of the system's operational reliability, supportability, availability, and safety. See AFR 80-14 for more information.

GLOSSARY:

DT&E Organization. The organization elements (primarily implementing command and development contractor) responsible for demonstrating that the system (including hardware and software) design and development is complete, that design risks have been minimized, and that the system will perform as required and specified.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 008

QUESTION: The Operational Test and Evaluation (OT&E) organization external interfaces are adequate.

ACTIVITY(S): Procurement

EXPLANATION: The OT&E is managed by AFOTEC. OT&E is conducted by AFOTEC and/or participating commands. Interfaces with nearly all program organization elements is possible depending upon the system being acquired. Some of the functions of these interfaces are to communicate an estimate of the system's operational effectiveness and suitability, identify operational deficiencies, recommend changes, and identify system/software characteristics and deficiencies which can significantly impact support costs. See AFR 80-14, AFR 55-43, and AFOTECR 55-1 for more information.

GLOSSARY:

OT&E Organization. The organization elements (primarily AFOTEC and participating commands) responsible for the estimation of a system's operational effectiveness and suitability, identification of any operational and support deficiencies, and identification of any need for modifications.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 009

QUESTION: The Computer Resources Working Group (CRWG) external interfaces are adequate.

ACTIVITY(S): Procurement

EXPLANATION: For each system utilizing computer resources, a CRWG must be established immediately after Milestone I to aid in the management of the system's computer resources and in the development of the CRLCMP(CRISP). The purpose of the CRWG is to assist the program manager in initiating activities that are prerequisites to development and support of computer resources. The CRWG should also assist in ensuring that computer resources comply with established policy, procedures, plans, and standards. The CRWG should include representatives of the procurement activity, operation support activity, and also other organizations that have been assigned responsibilities for software development, testing, training, and support.

GLOSSARY:

CPWG. Computer Resources Working Group is chaired by the program office and consists of representatives of the participating commands and test organizations. Primary function is to produce CRLCMP(CRISP).

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 010

QUESTION: The Test Planning Working Group (TPWG) external interfaces are adequate.

ACTIVITY(S): All

EXPLANATION: The TPWG assists the program manager on test matters. This assistance includes: defining responsibilities and relationships among test program participants; establishing test objectives; preparation of the TEMP; identifying test resources; preparing test portions of RFPs, SOWs, and related contractual documents; and acting as a forum for surfacing and resolving test-related issues.

GLOSSARY:

TPWG. The Test Planning Working Group is chaired by the implementing command with representatives from the using and supporting commands, and the test organizations (DT&E,OT&E), and where appropriate, the development contractor and subcontractors.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 01?

QUESTION: The Interface Control Working Group (ICWG) external interfaces are adequate.

ACTIVITY(S): All

EXPLANATION: The procurement activity should establish an ICWG to address system/subsystem interface requirements, including those that affect computer resources. Early in the system acquisition process, the ICWG supports the procurement activity in defining current and proposed computer software and hardware interfaces. The interface description should include quatitative data needed to accurately define interfaces. Interoperability requirements should be included in the interface definition. The procurement, development contractor, and operation support activities should provide computer resource inputs to the ICWG to ensure that system interfaces adequately reflect software and hardware characteristics.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 012

QUESTION: The Independent Verification and Validation (IV&V) agency external interfaces are adequate.

ACTIVITY(S): All

EXPLANATION: The procurement activity should determine IV&V requirements. The CRWG will assess the need for IV&V and provide recommendations to the procurement activity. The determination should consider the criticality of the system mission, the risk associated with the development, and the level of software complexity. The procurement activity should define the scope and timing of the IV&V and develop a plan for the IV&V effort. The IV&V decisions should be documented in the CRLCMP. If IV&V is to be included in the software development, it must be initiated not later than the award of the development contract. Procurement activities for the IV&V effort should be completed in advance of the Software Specification Review to allow verification of the software requirements before the review is conducted. The procurement activity shall: control the interface between the IV&V agency and the development contractor; provide the IV&V agency with copies of the appropriate development specifications, design documents, listings, and discrepancies found by the IV&V agency.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 013

QUESTION: The software configuration management interfaces among all activities' management components for the subject system are adequate.

ACTIVITY(S): All

EXPLANATION: Each of the activities has responsibilities for configuration management which require interface communication. Assignment of identification numbers is a procurement and operation support (AFLC) responsibility dependent upon the development contractor formal request for such numbers. The procurement activity maintains the formal baselines (Functional, Allocated, Product) while the development contractor maintains Developmental Baselines up to delivery of the Product Baseline. Changes, refinements, and so forth must be communicated. The procurement and development contractor must coordinate transfer of configuration management responsibility as defined in the CRLCMP (CRISP, O/S CMP) with the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SPM(PI) - 014

QUESTION: The software quality assurance management interfaces among all activities' management components for the subject system are adequate.

ACTIVITY(S): All

EXPLANATION: The overall software quality program for the computer software development cycle should be defined by the procurement activity and operation support activity through contractual requirements. Responsibility for assessing computer software products and related procedures may be assigned to more than one organization. It may be appropriate for an independent organization, such as an IV&V organizatin, that is subject to neither financial nor managerial control by the development contractor, to perform certain of these assessments.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 015

QUESTION: The contract management interfaces among all activities' management components for the subject system are adequate.

ACTIVITY(S): All

EXPLANATION: Contactual provisions should reflect the Government's requirements for rights to the computer software and associated documentation. Development contractor limited-rights software to be used in the performance of the contract or to be delivered under the contract should be identified. Pre-determination agreements should be included in the contract to enable the Government to subsequently acquire additional required rights. Because computer resources (including computer software) may be developed under a subcontract to a prime contractor, the procurement activity should ensure that all appropriate contractual requirements levied on the prime development contractor are passed to the subcontractor. The procurement activity should ensure that the contract makes the subcontractor responsible for the integrity of subcontracted products and makes the prime development contractor responsible for deliverey of an acceptable product under the contract.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SPM(PI) - 016

QUESTION: The interservice external interfaces with all activities' management components are adequate.

ACTIVITY(S): All

EXPLANATION: Before each system milestone, interservicing potential should be reviewed and the management and life cycle cost implications of major software support options should be analyzed. This analysis should also consider impact on operational needs, configuration management, and system integration. For interservice systems, the CRWG and ICWG shall be interservice groups that include representatives from the cognizant participating organization elements (commands, agencies, etc.). The interservice working groups should ensure that analysis is performed to determine the optimum support approach, this analysis is documented, and recommendations are made to the procurement activity concerning the support approach.

GLOSSARY:

RESPONSE INSTRUCTIONS:

- A/6: There are no joint service requirements for the system or its embedded software.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE CONFIGURATION MANAGEMENT IDENTIFICATION

The questions SCM(ID)-001 through SCM(ID)-021 address issues of software configuration identification for the procurement, development contractor, and operation support activities. Configuration identification is established in the form of technical documentation that becomes more detailed as development proceeds and more refined as the final development products are evolved during post deployment support. Three stages of configuration identification are generally employed during the software system's life cycle:

(1) Functional Configuration Identification
(2) Allocated Configuration Identification
(3) Product Configuration Identification

In addition, the development contractor activity has internal iterations of the identifications called Development Identifications which are controlled by the necessary internal software configuration management process.

These Identifications correspond to the three system development baselines:

(1) Functional Baseline
(2) Allocated Baseline
(3) Product Baseline

and, the appropriate development contractor Development Baselines. The Identifications become Baselines when the procurement activity approves the Identifications and puts the configuration identification under its contractual configuration control system. Identification is used for visibility and baselines are used for control.

The term "identification" also has an important secondary meaning as a document or set of documents that defines the configuration of an item. In this sense it represents one or more material things (documents).

QUESTION DATA SHEET

Question Number SCM(ID) - 001

QUESTION: The procurement policy, standards, and conventions applied to the identification of software configuration items are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: Identification of computer software configured items and procedures for assigning identification numbers/names is described in AFR 800-21. It is the responsibility of the procurement activity to assure that proper policy, standards, and conventions are required for the naming of configured items. Directive and guidance documents include AFR 65-3 and AFR 800-14(Vol II). Contractor compliance documents which could be required include MIL-STD-480A, MIL-STD-482A, MIL-STD-483A, and MIL-STD-490A, and DoD-STD 2167.

GLOSSARY:

Software Configuration Items. Software elements which are designated for configuration control by the contractual requirements.

Identification. The official character/numeric identifier of a configured item and its functional purpose and relationship with other configured items for purposes of configuration management.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 002

QUESTION: The procurement identification of deliverable software configuration items is adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: Frequently software items are not required to be delivered. The CDRL is the basis for delivery. The CDRLs should carefully identify all operational, test, and support software deliverables. Included with this identification is the form of the deliverable (e.g., document, source, object, load module), and the medium on which the deliverable will be produced. Include in the contract all software including firmware and proprietary items that are required to cost effectively use, operate, or modify the system over its life cycle. If it is not cost effective to acquire a software item, include an option to acquire it later.

GLOSSARY:

Deliverable Software. Identified by CDRLs.

Operational Software. Required to operate the system.

Test Software. Used to analyze or test system and component performance.

Support Software. Used generally to develop or maintain othe software. Includes system software such as operating systems and compilers.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 003

QUESTION: The procurement activity identification of the software configuration baselines is adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The software configuration baselines include the Functional Baseline, Allocated Baseline, and Product Baseline. When the procurement activity approves the development Configuration Identification for each of these baselines, then the Identification becomes the corresponding Baseline and is put under the procurement activity configuration control. This requires the procurement activity to have adequate identification capability to maintain such configuration control.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: _______
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 004

QUESTION: The system/segment specification adequately identifies elements of the software functional baseline.

ACTIVITY(S): Procurement

EXPLANATIONS: The system/segment specification is a formally controlled software item of a system procurement. This specification defines the Functional Configuration Identification of the software. The first version is usually prepared by the procurement activity and becomes a living document of the system/segment performance- oriented requirements. When it is approved by the procurement activity, it is "baselined" and comes under configuration control as the Functional Baseline. The Functional Baseline should be available at Milestone I, prior to Demonstration and Validation. It is critical that this specification reflect as complete a perspective on the functional aspects of the system as possible. It is also critical that this specification mature as early as possible to minimize perturbations on the rest of the system baselines.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 005

QUESTION: The performance requirement specifications adequately identify elements of the software allocated baseline.

ACTIVITY(S): Procurement

EXPLANATIONS: The performance requirement specifications are the descriptions of how the Functional Baseline is allocated into CSCIs (Computer Software Configuration Items) and HWCIs (Hardware Configuration Items). These specifications include preliminary requirement documents, and become living documents. When they are approved by the procurement activity they are "baselined" as the Allocated Baseline. The Allocated Baseline should be available at Milestone II, prior to full scale development. It is critical that these specifications reflect as complete a perspective on the detailed function allocation, test, and interface aspects of the system as possible. It is also critical that these specifications mature as early as possible to minimize full scale development perturbations.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 006

QUESTION: The implementation specifications adequately identify elements of the software product baseline.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The implementation specifications are the description of how the Allocated Baseline has been implemented as CSCIs (Computer Software Configuration Items) and HWCIs (Hardware Configuration Items). These implementation specifications include the "as built" detailed design documents, and become living documents. When they are approved by the procurement activity they are "baselined" and become the Product Baseline. It is critical that these specifications reflect as complete a perspective on the detailed design and coded aspects of the system as possible. It is also critical that these specifications mature as early as possible to facilitate the transfer, operation, and support of the software.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 007

QUESTION: The identifier characteristics for software configuration item names are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The identifier characteristics include: uniqueness, retrievability, traceability, pronouncibility, variability, functional significance, and compactness.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 008

QUESTION: The development contractor internal identifier naming standards/conventions satisfy contractual regulations.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The development contractor is (should be) required to follow Air Force regulations on Computer Program Identification Number (CPIN) assignments. Air Force directive guidance is found in AFR 65-3 and AFR 800-14 (Vol II), along with other documents. The development contractor compliance documents are DoD-STD-480A, MIL-STD-482A, MIL-STD-483A, and MIL-STD-490A. MIL-STD-490A is the key regulation for document identifier requirements, and MIL STD 483A is the key document for CSCI identifier requirements.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 009

QUESTION: Development contractor identification standards and conventions can be transitioned to operation support standards and conventions.

ACTIVITY(S): Development Contractor

EXPLANATIONS: In order for computer resources to be smoothly transitioned from the development contractor to the operation support activity, the configuration identification standards and conventions must be compatible. As more automated tools are used, this requirement for compatibility will be even stronger. Evidence of the standards and transition strategy should be in the CRLCMP (CRISP and O/S CMP) as well as the development contractor software configuration management plan.

GLOSSARY:

RESPONSE_INSTRUCTIONS:
F/1: No standards exist for the development contractor activity and/or the operation support activity

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 010

QUESTION: Development contractor deliverable configuration items are named to adequately identify multiple versions and variations.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The minimum requirement is for the name to provide for discrimination of versions. If software must be configured specifically for test purposes, multiple sites, and so forth, it will be necessary for the name to distinguish such variations of each version.

GLOSSARY:

Version. Baseline release of a configuration controlled item.

Variation. One of at least two physical configurations of the same version of a configuration controlled item. Variations of a version exist to support multiple service requirements as well as mission specific configurations (test, operational mission scenarios, alternate embedded computer systems, etc.).

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 011

QUESTION: Development contractor identification procedures are structured to permit easy addition, deletion, or modification or configured items at any hierarchical level.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The identification procedures should be specified in the Software Configuration Management Plan or perhaps a set of procedures to implement portions of the Plan. Hierarchical levels are CSCI, component, module, and routine. Such procedures are essential for adequate software supportability.

GLOSSARY:

RESPONSE INSTRUCTIONS:

F/1: No such procedures are documented or are totally inadequate

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 012

QUESTION: Development contractor identification procedures for addition, deletion, and modification of configured items are being followed.

ACTIVITY(S): Development Contractor

EXPLANATIONS: It should be possible to determine whether identification procedures are being followed through the standard management reporting requirements.

GLOSSARY:

RESPONSE INSTRUCTIONS:
F/1; No such procedures exist or are being totally ignored

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 013

QUESTION: The physical medium of configured items is adequately described by the development contractor software component/item identification scheme.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The physical medium (e.g., tape, disk, memory components) of configured items is required to meet Government standards. Part of those standards address identification names/numbers. It should be possible to trace the medium of a configured item from its descriptive label/name and any distinguishing aspects of the medium (e.g., working/master tape, sequential volume number for multi-volume storage items).

GLOSSARY:

Medium. Disk, tape, card deck, firmware, read-only memory, etc.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 014

QUESTION: The development contractor software identifiers adequately distinguish among different states (e.g., source, object, load, core images, listings) of the software.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The identifier should distinguish which state the software item is. For example, a distinguishing suffix might be attached to the software itemidentifier, such as: ".prg", ".txt", ".cmd", ".dat".

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 015

QUESTION: The development contractor software change control form identifiers are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The change control form identifiers should meet requirements of applicable government standards and provide sequential identification suitable for logging, filing, reference, and retrieval.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 016

QUESTION: Subcontractor configuration item identification practices are monitored by the development contractor.

ACTIVITY(S): Development Contractor

EXPLANATIONS: If there is a subcontractor, it will be necessary that the development contractor require configuration identification practices similar to those required by the procurement activity. If this is not done, then the development contractor will be required to retrofit the identification scheme of the subcontractor. The identification practices of the subcontractor must be carefully monitored to assure compatibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: No subcontractors are involved with producing software configuration items for the development contractor.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 017

QUESTION: The documentation which collectively identifies the content of a configuration item is adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The documentation might include a version description document, or a software configuration index. The version description document usually identifies changes to a baseline product. The configuration index is a representation of the full baseline product components (e.g., in a hierarchical chart) showing component relationships.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 018

QUESTION: Software configured items which implement safety provisions are adequately identified.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Configured items which implement safety provisions are frequently controlled by software. This software must be adequately identified as affecting safety. Safety provisions are closely related to the reliability of mission critical components, safety of mission personnel, nuclear effects, and so forth.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

A/6: There is no requirement for safety provisions to be implemented or controlled by software

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 019

QUESTION: Software configured items which implement computer/communications security provisions are adequately identified.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Software which implements computer/communication security is particularly important. Any such software items must be adequately identified as part of the trusted computer base. If the configured software item(s) are themselves classified, then appropriate security labels must be attached according to Air Force labeling requirements.

GLOSSARY:

Security Provisions. The totality of threats, vulnerabilities, and protection mechanisms involved with determining whether computer/communications assets can be compromised through data, process, or abuse violations. Security provisions exist across the administrative, system, and facility categories.

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for security provisions to be implemented in software.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 020

QUESTION: The identification requirements for post deployment support are adequately addressed in the CRLCMP (CRISP, O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the support evolution of the computer resources including configuration management features. The CRISP (first version) is required early in the life cycle, at least prior to full scale development. The O/S CMP is required prior to the end of the full scale development. Key to adequacy is the compatibility of the operation support configuration identification and the development contractor configuration identification.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(ID) - 021

QUESTION: The automated support tools for post deployment support of configuration identification are adequately addressed in the CRLCMP (CRISP, O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The use of automated support tools during development and transition of those tools to use during post deployment support is an important consideration for the overall enhancement of software supportability. The lack of such tools to manage the configuration identification index of the various baselines should be considered a serious deficiency.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE CONFIGURATION MANAGEMENT CONTROL

The questions SCM(CC)-001 through SCM(CC)-023 address issues of software configuration control for the procurement, development contractor, and operation support activities. Configuration control is the major process of configuration management. It is the process by which change decisions are made (by the Configuration Control Board structure), administered (by the Configuration Mangagement Office of the Program Office - or equivalent), and implemented (by change control personnel appropriate to the life cycle state of the software).

The decision-making part of configuration control determines whether proposed changes to a controlled document or software item will be beneficial to the Government in terms of operational effectiveness, support needs, cost, and/or schedule. The change administration and implementation parts ensure that all approved changes to a configuration are properly incorporated in the affected documents and software code and that no other changes find their way in.

Configuration control focuses on the approved baselines:

(1) Functional Baseline
(2) Allocated Baseline
(3) Product Baseline

and, the appropriate development contractor Development Baselines.

Software items and documents that are not baselined are not subject to baseline configuration control, but may be placed under internal (contractor or support) configuration control during the software life cycle. Baseline configuration control relies upon interaction among the procurement, development contractor, and operation support activities. The adequacy of the development contractor internal configuration control is important since the plans, techniques, and tools would be beneficial for transfer to the operation support activity for use during the post deployment life cycle phase. From the operation support viewpoint, it is not sufficient that the development contractor activity can control the baselines sufficiently to deliver a configured product. For smooth transition it is necessary that the configuration control process can be transitioned to or is compatible with the support activity configuration control process.

Interface control is also a very important aspect of configuration control, especially with systems which have multi-service operational requirements and systems which require more than one element for development or support. Separate control boards and review boards, and integrated working groups are required to manage the complicated development and support requirements.

QUESTION DATA SHEET

Question Number SCM(CC) - 001

QUESTION: The procurement policy, standards, and conventions applied to the control of software configuration items are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: Control of computer software configured items and procedures for changing configured items are described in directives, regulations, and guidelines: AFR 65-3, AFR 57-4, AFSCP 800-3, DoDD 5000.29, AFR 800-14, DoDD 5010.21, AFSCP 800-7. It is the responsibility of the procurement activity to assure that proper policy, standards, and conventions are required for the control of configured items. Contractor compliance documents which could be required include MIL-STD-480A, MIL-STD-482, MIL-STD-483A, MIL-STD-490A, and DoD-STD-2167.

GLOSSARY:

Software Configuration Items. Software elements which are designated for configuration control by the contractual requirements.

Control. The process of systematic oversight of changes to a configured item and its functional relationship with other configured items for purposes configuration management.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 002

QUESTION: The procurement activity has implemented adequate software configuration management, based upon regulations, to control the functional and physical characteristics of all CSCIs.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement program manager is responsible for implementing a configuration management program based on AFR 65-3 that will identify, document, and control the functional and physical characteristics of all CSCIs under development. Primary planning document is the Program Management Plan (PMP). Other activities include: coordinating requirements with using and supporting agencies; reviewing contractor plans; auditing contractor implementation of plans; ensuring configuration identifications for all CSCIs are properly documented; controlling engineering changes to baselines; providing interface control for distribution of changes; preparing PMRT package for transfer to the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 003

QUESTION: The procurement configuration management planning documents contain sufficient guidance for configuration control.

ACTIVITY(S): Procurement

EXPLANATIONS: The major planning documents for procurement are the Program Management Plan (PMP), the Request for Proposal(RFP)/Statement of Work(SOW), the Contract Data Requirements List(CDRL), and the Computer Resources Integrated Support Plan (CRISP). The Joint Logistics Commanders software standardization program has a replacement for the CRISP called the Computer Resources Life Cycle Management Plan (CRLCMP). AFR 800-14 calls for the inclusion of configuration management concepts in the PMP including configuration control (specification and interfaces). The RFP/SOW defines the e exact scope of the development contractor's configuration control responsibilities. The CDRL identifies all deliverable data items including CSCIs which the development contractor must deliver and control. The CRISP must to include assignment of configuration control responsibilities during post deployment support with detailed procedures defined in the Operational/Support Configuration Management Procedures (O/S CMP).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 004

QUESTION: The development contractor configuration management activities are adequately monitored by the procurement activity.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement activity can monitor development contractor configuration management activities through contractor documents and reports, other program office areas (e.g., quality assurance), configuration audits, and evaluation checklists (e.g., FCA and PCA preparation checklists in MIL-STD-1521B, ECP preparation checklists in DoD-STD-480A and modified by MIL-STD-483A, Computer Resource Manager's Checklist based on AFR 800-14, and attachments 3,4,5 of AFSCP 800-7 on RFPs and contracts).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 005

QUESTION: The procurement configuration control procedures for the Class I and Class II changes (or equivalent categories) are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The Class I changes involve primarily any major changes to the Configuration Baselines, contractual provisions, support compatibility, and so forth. Class II changes are for minor deficiencies and do not generally require procurement approval, but there should still exist a mechanism for procurement review since many times Class II changes could cause side effects which might result in the change being reclassified as a Class I change. A Class II change is justified if it benefits the development contractor and is not detrimental to the Government (procurement and operation support). Guidance for Class I and Class II changes is found in DoD-STD-480A, MIL-STD-483A, and other government internal and compliance documents.

GLOSSARY:

Class I Change. Engineering change which affects a Baseline Identification, performance outside stated tolerances, external interface characteristics, budget/resource requirements, or other factors of major significance to the operational effectiveness or suitability of the software product.

Class II Change. Engineering change not classified as Class I. Includes minor changes such as typographical errors in documents, addition of comments to source code, changes to adaptation data such as data base parameters, and single recompilations.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 006

QUESTION: The use of deviations and waivers by the development contractor which could affect the supportability of the software has been adequately controlled by the procurement activity.

ACTIVITY(S): Procurement

EXPLANATIONS: The use of deviations and waivers must be carefully monitored for the possible adverse affect upon software's supportability even though the operational effectiveness may not seem to be directly affected. As an example, if the use of a High Order Language is waived, then the supportability of the software has been affected.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE:
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 007

QUESTION: The procurement baseline control forms are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement baseline control forms might include: Engineering Change Proposal (ECP), Specification Change Notice(SCN), Request for Waiver, Software Deficiency Report, and Software Change Report.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 008

QUESTION: The procurement configuration control board procedures are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement CCB procedures include conduct of meetings, maintenance of records, control of the baselines, integration of hardware and software concerns during the change process, formation of a separate software configuration control board if the complexity of the software so justifies such a board, and control of interoperability interface problems across any associated systems. Change control procedures should provide for careful evaluation of all ECPs according to considerations mentioned in AFR 65-3 and AFSCP 800-7. In particular, CSCI changes which have an effect on multiple- location applications, nuclear safety, security, cost, schedule, other CSCIs, other hardware or interfaces, and support resources must be carefully analyzed for overall benefit to the Government.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 009

QUESTION: The procurement procedures for turnover and transfer of configuration control to the operation support activity has been adequately planned.

ACTIVITY(S): Procurement

EXPLANATIONS: The AFR 800-19 governs system turnover, and the CRLCMP (CRISP and O/S CMP) contains specific guidance as to the form and format of what the turnover at PMRT will be. Key to the adequacy of this process is the amount of early planning and the specificity of the details in the CRLCMP (CRISP and O/S CMP) at the milestone (and interim milestone) decision points. Frequently the mere existence of such documents does not imply that they are at all adequate.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 010

QUESTION: Development contractor configuration control standards and conventions can be transitioned to operation support standards and conventions.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The AFR 800-19 governs system turnover, and the (CRISP and O/S CMP) contains specific guidance as to the form and format of what the turnover at PMRT will be. Key to the adequacy of this process is the amount of early planning and the specificity of the details in the CRISP and O/S CMP at the milestone (and interim milestone) decision points. Frequently the mere existence of such documents does not imply that they are at all adequate.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 011

QUESTION: The development contractor configuration control board has an adequate interface with the procurement activity configuration control board.

ACTIVITY(S): Development Contractor

EXPLANATIONS: AFR 800-14 requires computer program configuration management to be integrated into the overall system configuration management and across all cognizant organization elements. Interfaces are very important, and one of the most important is the communication between the procurement and development contractor configuration control boards. The CCBs are the official organizations empowered to act on all proposed changes. The primary changes which would require interfacing are Class I changes. MIL-STD-483A is the primary development contractor compliance regulation.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 012

<u>QUESTION:</u> The development contractor configuration control board procedures are adequate to distinguish between hardware and software failures.

<u>ACTIVITY(S):</u> Development Contractor

<u>EXPLANATIONS:</u> For large systems separate hardware and software boards may be established under a system level board. Failure reporting must adequately characterize failures so determination of the source of the failure is possible. Such reports and solutions to failures can then be processed more adequately by the control boards.

<u>GLOSSARY:</u>

<u>RESPONSE INSTRUCTIONS:</u>

<u>RESPONSE RATIONALE:</u>

<u>RESPONSE SCORE:</u> ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 013

QUESTION: The development contractor configuration control procedures can be transitioned to or are compatible with the operation support activity planned configuration control procedures.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The CRLCMP (CRISP and O/S CMP) describes the operation support planned configuration control procedures, usually in accordance with AFR 57-4. Contractor compliance documents include DoD-STD-480A and MIL-STD-483A. The contractor's configuration control procedures should be documented in a Software Configuration Management Plan.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 014

QUESTION: The development contractor automated support tools for configuration control of baselines and internal development identifications is adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The automated support tools might include a control library, automated procedures to lock out multiple personnel from modifying a module at the same time, automated version and variation identification, automated traceability of requirements, design, code, and test elements, and so forth. The use of automated tools is essential for complex software systems.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

STION DATA SHEET

Question Number SCM(CC) - 015

QUESTION: The development contractor software change control forms are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The change control forms should meet requirements of applicable Government standards, and provide sequential identification suitable for logging, filing, reference, and retrieval. Content should adequately address source of change request, reason for request, type (enhancement, correction) of request, effect of change on the system, resource requirements to implement the change, and administrative information such as approval signatures required and expected (actual) change milestone dates.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 018

QUESTION: Subcontractor configuration item control practices are monitored by the development contractor.

ACTIVITY(S): Development Contractor

EXPLANATIONS: If there is a subcontractor, it will be necessary that the development contractor require configuration control practices similar to those required by the procurement activity. If this is not done, then the development contractor will be required to retrofit the control practices of the subcontractor. The control practices of the subcontractor must be carefully monitored to assure compatibility and proper interfaces of the cognizant configuration control boards.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

A/S: No subcontractors have responsibility for development of software products

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 017

QUESTION: Configured items which implement safety provisions are adequately controlled.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Configured items which implement safety provisions are frequently controlled by software. This software must be adequately identified as affecting safety. Safety provisions are closely related to the reliability of mission critical components, safety of mission personnel, nuclear effects, and so forth.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for safety provisions to be implemented or controlled by software

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 018

QUESTION: Software configured items which implement computer/communications security provisions are adequately controlled.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Software which implements computer/communication security is particularly important. Any such software items must be adequately controlled as part of the trusted computer base. If the configured software item(s) are themselves classified, then appropriate security labels must be attached according to Air Force labeling requirements and access control of such items must be enforced.

GLOSSARY:

Security Provisions. The totality of threats, vulnerabilities. and protection mechanisms involved with determining whether computer/communications assets can be compromised through data, process, or abuse violations. Security provisions exist across the administrative, system, and facility categories.

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for security provisions to be implemented in software.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SCM(CC) - 019

QUESTION: Distribution of configured item changes from the operation support activity to the field is adequately controlled.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The distribution must satisfy applicable standards and regulations for technical orders as well as the mission critical issues of correctness of changes and timeliness of changes. Interfaces among operation support and field support organization elements, including configuration boards and logistics supply for technical orders, are critical to the success of the distribution process.

GLOSSARY:

RESPONSE INSTRUCTIONS:

Timeliness of the distribution process after engineering release is complete is one of the critical issues to consider. Although there are no fixed standards, it seems reasonable that no more than 50% of the time spent for engineering should be required to complete the distribution to the field. This "percentage" is bound by a lower absolute value of time required based upon physical limitations (e.g., prom burning, technical order generation) of the distribution process.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 020

QUESTION: The configuration control responsibility for integrating computer resources into the system has remained centralized throughout the life of the system.

ACTIVITY(S): All

EXPLANATIONS: Although organizational elements (e.g., HQ-TAC, HQ-AFLC) may have configuration control responsibilities for separate elements of the system (e.g., software, hardware) there should be a centralized control point for all decisions (perhaps a set of configuration control boards). As the software is passed from the development contractor to the operation support activity the configuration control responsibilities are passed from the centralized development configuration control to the centralized support configuration control, with appropriate planning and attention to the actual transfer of responsibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 021

QUESTION: The configuration control requirements for post deployment support are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The CRISP (first version) is required early in the life cycle, at least prior to full scale development. The O/S CMP is required prior to the end of the full scale development. Key to adequacy is the compatibility of the operation support configuration control and the development contractor configuration control procedures and automated tool support.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
[illegible] COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 022

QUESTION: The operation support configuration control boards are adequately defined to handle software changes.

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The configuration control boards along with specific board responsibilities should be defined in the CRISP and the O/S CMP. It is not enough to indicate that a given directive, regulation, standard, or guideline will be followed. Specific detail as to the board function, relationship to the organizaitonal structure, interface responsibilities, and so forth should be included in the operation support configuration management plan and procedures.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(CC) - 023

QUESTION: The automated support tools for post deployment support of configuration control are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The use of automated support tools during development and transition of those tools to use during post deployment support is an important consideration for the overall enhancement of software supportability. The lack of such tools to assist in the configuration control of the various baselines should be considered a serious deficiency.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________ (COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE CONFIGURATION MANAGEMENT STATUS ACCOUNTING

The questions SCM(SA)-001 through SCM(SA)-016 address issues of software configuration status accounting for the procurement, development contractor, and operation support activities. Configuration status accounting is the process of keeping track of the configuration identification and its changes, and reporting this information to management. Two types of documents are produced by configuration status accounting:

(1) Software Configuration Index: defines the current approved configuration of an item in terms of its elements or identification documents and its approved changes
(2) Change Status Reports: for deficiency and modification changes to a configured item.

These configuration status accounting documents provide all activities with visibility and traceability of baseline configurations and their changes. Coordination of activities and decisions regarding these activities such as scheduled reviews, audits, tests, use of test resources, requirements for budget adjustments to the contract, and so forth are based upon configuration status accounting information.

QUESTION DATA SHEET

Question Number SCM(SA) - 001

QUESTION: The procurement policy, standards, and conventions applied to the configuration status accounting of software configuration items are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: Documentation for describing and reporting the status of computer software configured items is described in directives, regulations, and guidelines: AFR 65-3, AFR 57-4, AFSCP 800-3, DoDD 5000.29, AFR 800-14, DoDD 5010.21, AFSCP 800-7. It is the responsibility of the procurement activity to assure that proper policy, standards, and conventions are required for the configuration status accounting of configured items. Contractor compliance documents which could be required include MIL-STD-480A, MIL-STD-482, MIL-STD-483A, MIL-STD-490A, and DoD-STD-2167.

GLOSSARY:

Software Configuration Items. Software elements which are designated for configuration status accounting by the contractual requirements.

Configuration Status Accounting. The means through which actions affecting CSCIs are recorded and reported to program and functional managers.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 002

QUESTION: The procurement activity has implemented adequate software configuration status accounting, based upon regulations, to report the functional and physical characteristics of all CSCIs.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement program manager is responsible for implementing a configuration management program based on AFR 65-3 that will identify, document, and control the functional and physical characteristics of all CSCIs under development. Primary planning document is the Program Management Plan (PMP). Other activities include: coordinating requirements with using and supporting agencies; reviewing contractor plans; auditing contractor implementation of plans; ensuring configuration identifications for all CSCIs are properly documented; controlling of engineering changes to baselines; controlling distribution of changes; preparing PMRT package for transfer to the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SCM(SA) - 003

QUESTION: The procurement configuration management planning documents contain sufficient guidance for configuration status accounting.

ACTIVITY(S): Procurement

EXPLANATIONS: The major planning documents for procurement are the Program Management Plan (PMP), the Request for Proposal(RFP)/Statement of Work(SOW), the Contract Data Requirements List(CDRL), and the Computer Resources Integrated Support Plan (CRISP). The Joint Logistics Commanders software standardization program has a replacement for the CRISP called the Computer Resources Life Cycle Management Plan (CRLCMP). AFR 800-14 calls for the inclusion of configuration management concepts in the PMP (including specification and interfaces). The RFP/SOW defines the exact scope of the development contractor's configuration status accounting responsibilities. The CDRL identifies all deliverable data items including CSCIs which the development contractor must deliver and control. The CRISP is to include CSCI configuration baseline reporting procedures to account for the implementation of changes. Detailed procedures should be defined in the Operational/Support Configuration Management Procedures (O/S CMP).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE:
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 004

QUESTION: The procurement activity configuration status accounting procedures are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement activity configuration status accounting procedures include procedures to report baseline configuration identification and change status, contract management modifications, specification status and changes, ECPs and SCNs, and any other documents which record the software history of development, and support. This history becomes part of the PMRT package to be transferred to the operation support activity. This history provides traceability to the configuration management process and the resulting software products. Use of automated support tools should aid the effectiveness and efficiency of the configuration status accounting procedures.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

[illegible]

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 005

QUESTION: The development contractor internal configuration status accounting procedures are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Procedures should be documented in a required software configuration management plan. Procedures include: how information on status is to be collected, verified, stored, processed, and reported; identification of the periodic reports to be provided and their distribution. Information to be maintained includes: status of specifications and proposed changes; reports of approved changes; status of product versions or revisions; reports of the implementation of installed updates or releases; status of procurement supplied property.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE 1 2 3 4 5 6 COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 006

QUESTION: Development contractor configuration status accounting standards and conventions can be transitioned to operation support standards and conventions.

ACTIVITY(S): Development Contractor

EXPLANATIONS: In order for computer resources to be smoothly transitioned from the development contractor to the operation support activity, the configuration identification standards and conventions must be compatible. As more automated tools are used, this requirement for compatibility will be even stronger. Evidence of the standards and transition strategy should be in the CRLCMP (CRISP and O/S CMP) as well as the development contractor software configuration management plan.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 007

QUESTION: The development contractor configuration status accounting has an adequate interface with the procurement activity configuration status accounting.

ACTIVITY(S): Development Contractor

EXPLANATIONS: AFR 800-14 requires computer program configuration management to be integrated into the overall system configuration management and across all cognizant organization elements. The status accounting interface between procurement and development contrator is the basis for reporting all significant baseline product actions and the current state of those actions. Early resolution of problems is a direct function of how accurately, concisely, and efficiently such status accounting information is presented. The primary changes which require interface status reports are Class I changes. MIL-STD-483A is the primary development contractor compliance regulation.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 008

QUESTION: The development contractor configuration status accounting procedures can be transitioned to or are compatible with the operation support activity planned configuration status accounting procedures.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The CRISP and the O/S CMP (or the CRLCMP) describe the operation support planned configuration status accounting procedures, usually in accordance with DoD-STD-480A and MIL-STD-483A. The operation support activity's internal configuration status accounting procedures should be documented in a Software Configuration Management Plan or an associated set of procedures.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: _______
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 009

QUESTION: The development contractor automated support tools for configuration status accounting of baselines and internal development identifications are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The automated support tools might include a control library, automated procedures for form generation and retrieval, automatic traceability for version control, implemented changes and outstanding problem reports. Traceability of requirements, design, code, and test elements, is important for keeping track of precise configuration identification of baseline data. The use of automated tools is essential for complex software systems.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 010

QUESTION: The development contractor software configuration status accounting forms are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The status accounting forms must provide adequate information to track internal development baselines as well as the Functional, Allocated, and Product baselines. MIL-STD-482A contains configuration status accounting data elements and related features. Typical government forms include ECP, SCN, configuration control board directive, time compliance technical order, deficiency report, and change/modification report. Internal status accounting forms must be adequate to track necessary status reporting such as problem analysis, solution, change implementation, and closure. In addition, general reporting documents such as a product status report, open software problems report, and deliverable document status report must be maintained in order that contractually required status information can be adequately derived and justified.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SCM(SA) - 011

QUESTION: Subcontractor configuration item configuration status accounting procedures are monitored by the development contractor.

ACTIVITY(S): Development Contractor

EXPLANATIONS: If there is a subcontractor, it will be necessary that the development contractor require configuration status accounting practices similar to those required by the procurement activity. If this is not done, then the development contractor will be required to retrofit the configuration status accounting scheme of the subcontractor. The configuration status accounting identification practices of the subcontractor must be carefully monitored to assure compatibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: No subcontractors are involved with producing software configuration items for the development contractor.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 012

QUESTION: Status of software configuration items which implement safety provisions is adequately reported.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Configured items which implement safety provisions are frequently controlled by software. Status of this software must be adequately monitored and reported as affecting safety. Safety provisions are closely related to the reliability of mission critical components, safety of mission personnel, nuclear effects, and so forth.

GLOSSARY:

RESPONSE_INSTRUCTIONS:
A/6: There is no requirement for safety provisions to be implemented or controlled software

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 013

QUESTION: Status of software configured items which implement computer/communications security provisions is adequately reported.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Software which implements computer/communication security is particularly important. Any such software items must be adequately controlled as part of the trusted computer base. If the configured software item(s) are themselves classified, then appropriate security labels must be attached according to Air Force labeling requirements and access control of such items must be enforced. Status information on such software must be reported.

GLOSSARY:

Security Provisions. The totality of threats, vulnerabilities, and protection mechanisms involved with determining whether computer/communications assets can be compromised through data, process, or abuse violations. Security provisions exist across the administrative, system, and facility categories.

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for security provisions to be implemented in software.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 014

QUESTION: The configuration status accounting requirements for post deployment support are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The CRISP (first version) is required early in the life cycle, at least prior to full scale development. The O/S CMP is required prior to the end of the full scale development. Key to adequacy is the compatibility of the operation support configuration status accounting and the development contractor configuration status accounting.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________

COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE

QUESTION DATA SHEET

Question Number SCM(SA) - 015

QUESTION: The operation support configuration status accounting procedures are adequately defined to handle software change reporting requirements.

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The configuration status accounting procedures along with specific responsibilities should be defined in the CRISP and the O/S CMP. It is not enough to indicate that a given directive, regulation, standard, or guideline will be followed. Specific detail as to the format and content of status reports, organizational structure, interface responsibilities, and so forth should be included in the operation support Software Configuration Management Plan.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(SA) - 016

QUESTION: The automated support tools for post deployment support of configuration status accounting are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The use of automated support tools during development and transition of those tools to use during post deployment support is an important consideration for the overall enhancement of software supportability. The lack of such tools to manage the configuration status accounting of the various baselines should be considered a deficiency.

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

SOFTWARE CONFIGURATION MANAGEMENT AUDIT/REVIEW

The questions SCM(AR)-001 through SCM(AR)-013 address issues of software configuration Audit/Review for the procurement, development contractor, and operation support activities. Software Configuration Audit/Review is conducted to verify that a completed software product satisfies requirements. Procurement conducts official contractual configuration-oriented audits and reviews. Portions of the development reviews (PDR, CDR, Test Readiness Review(TRR)) are devoted to configuration-oriented review of production products as identified in developmental baselines. The major configuration audits for procurement are:

(1) Functional Configuration Audit (FCA)
(2) Physical Configuration Audit (PCA)

A Formal Qualification Review (FQR) for each CSCI constitutes a configuration audit if it is included as part of the CSCI Configuration Index. In this case procurement and perhaps operation support representatives review the product specifications, Preliminary Qualification Test (PQT) data, and Formal Qualification Test (FQT) data to certify that the CSCI is qualified for its intended application. The FQR follows the FCA and PCA.

The development contractor activity participates in the preparation for and conduct of formal configuration audits and reviews. In addition, internal audits and reviews are typically part of a broad quality assurance function.

The operation support activity has a responsibility to monitor procurement and development contractor audits and reviews. This monitor information is integrated into the operation support plans. The operation support configuration audit/review is similar to the procurement for the formal baselines and like the development contractor for the internal audits and reviews.

QUESTION DATA SHEET

Question Number SCM(AR) - 001

QUESTION: The procurement policy, standards, and conventions applied to the audit and review of software configuration items are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: Audit/review of computer software configured items is described in directives, regulations, and guidelines: AFR 65-3, AFR 57-4, AFSCP 800-3, DoDD 5000.29, AFR 800-14, DoDD 5010.21, AFSCP 800-7. It is the responsibility of the procurement activity to assure that proper policy, standards, and conventions are required for the audit/review of configured items. Contractor compliance documents which could be required include MIL-STD-480A, MIL-STD-482, MIL-STD-483A, MIL-STD-490A, MIL-STD-1521B, and DoD-STD-2167.

GLOSSARY:

Software Configuration Items. Software elements which are designated for Configuration Audit/Review by the contractual requirements.

Audit/Review. The process of informal and formal verification that a particular product has satisfied a specified set of requirements.

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 002

QUESTION: The procurement activity has implemented adequate software configuration audit/review based upon regulations to control the functional and physical characteristics of all CSCIs.

ACTIVITY(S): Procurement

EXPLANATIONS: The procurement program manager is responsible for implementing a configuration management program based on AFR 65-3 that will identify, document, and control the functional and physical characteristics of all CSCIs under development. Primary planning document is the Program Management Plan (PMP). Other activities include: coordinating requirements with using and supporting agencies; reviewing contractor plans; auditing contractor implementation of plans; ensuring configuration identifications for all CSCIs are properly documented; controlling engineering changes to baselines; providing interface control for distribution of changes; and preparing the PMRT package for transfer to the operation support activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 003

QUESTION: The procurement configuration management planning documents contain sufficient guidance for configuration audit/review.

ACTIVITY(S): Procurement

EXPLANATIONS: The major planning documents for procurement are the Program Management Plan (PMP), the Request for Proposal(RFP)/Statement of Work(SOW), the Contract Data Requirements List(CDRL), and the Computer Resources Integrated Support Plan (CRISP). The Joint Logistics Commanders software standardization program has a replacement for the CRISP called the Computer Resources Life Cycle Management Plan (CRLCMP). AFR 800-14 calls for the inclusion of configuration management concepts in the PMP including specification and interfaces). The RFP/SOW defines the exact scope of the development contractor's configuration audit/review responsibilities. The CDRL identifies all deliverable data items including CSCIs which the development contractor must deliver and control. The CRISP is to include assignment of configuration audit/review responsibilities during post deployment with detailed procedures defined in the Operational/Support Configuration Management Procedures (O/S CMP).

GLOSSARY:

RESPONSE_INSTRUCTIONS:

RESPONSE_RATIONALE:

RESPONSE_SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 004

QUESTION: The conduct of formal reviews and audits follows a format based on the checklists from MIL-STD-1521B, appropriately tailored for the specific software audit/review.

ACTIVITY(S): Procurement

EXPLANATIONS: The MIL-STD-1521B is the compliance document for development contractor audits and reviews. It is procurement's responsibility to provide the guidance for what standards, regulations, and tailoring guidance is required. It is the development contractor's responsibility to follow the requirements. There are related configuration audits and evaluation checklists (e.g., FCA and PCA preparation checklists in MIL-STD-1521B, ECP preparation checklists in DoD-STD-480A and modified by MIL-STD-483A, Computer Resource Manager's Checklist based on AFR 800-14, and attachments 3,4,5 of AFSCP 800-7 on RFPs and contracts).

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 005

QUESTION: The software product acceptance requirements are adequate.

ACTIVITY(S): Procurement

EXPLANATIONS: The software product acceptance criteria should be clearly documented. The acceptance tests, demonstrations, DT&E, OT&E, qualification tests, audits, and reviews all form a part of these acceptance requirements. The procurement activity has the responsibility to make sure such acceptance requirements are cost effective, functionally adequate, and specified from the time of the RFP/SOW/CDRL. Frequent modification to the original requirements indicates a lack of understanding concerning the original system specifications. This is likely to result in a less mature system to be supported.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 006

QUESTION: The development contractor internal configuration audit/review process facilitates the development of high quality production software.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The internal development contractor procedures for audit and review can be an important part of the process to build-in software supportability characteristics in the software products. This shows up in both the transition of life cycle processes and in the transition of the software product baseline. The internal audit/review process also tends to reflect how successful the formal contractual audit/reviews will be.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 007

QUESTION: Configuration audit/review interfaces among procurement, development contractor, and operation support activities are adequate.

ACTIVITY(S): Development Contractor

EXPLANATIONS: The activities require information from all levels of the audit/review process in order to properly plan for specific activity resources, funding levels, resolution of problems, and so forth. An interface control working group is an appropriate medium for coordinating schedule, responsibilities, contractual aspects, and results of the audit/reviews.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1.2.3.4.5.6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 008

QUESTION: The development contractor configuration management tool support facilitates the audit/review of the process by which changes are incorporated into configuration identifications.

ACTIVITY(S): Development Contractor

EXPLANATIONS: It is required to audit/review all changes that have been incorporated into a configuration identification. It greatly facilitates the audit/review process if the change process is automated and tool support is available to indicate the configuration identification with and without the incorporated changes. Configuration identification comparator tools can indicate which elements of the configuration identification have been changed as a confirmation of the incorporated changes. The availability of such automated tool support greatly facilitates the efficiency and accuracy of the audit and review activity.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 009

QUESTION: Subcontractor configuration item audit/review practices are monitored by the development contractor.

ACTIVITY(S): Development Contractor

EXPLANATIONS: If there is a subcontractor, it will be necessary that the development contractor require configuration audit/review practices similar to those required by the procurement activity. If this is not done, then the development contractor will be required to retrofit the audit/review scheme of the subcontractor. The audit/review practices of the subcontractor must be carefully monitored to assure compatibility.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: No subcontractors are involved with producing software configuration items for the development contractors.

RESPONSE RATIONALE:

RESPONSE SCORE: ________

(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 010

QUESTION: Configured items which implement safety provisions are adequately audited and reviewed.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Configured items which implement safety provisions are frequently controlled by software. This software must be aduquately identifiud as affecting safety. Safety provisions are closely related to the reliability of mission critical components, safety of mission personnel, nucleer effects, and so forth.

GLOSSARY:

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for safety provisions to be implemented or controlled by software

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 011

QUESTION: Software configured items which implement computer/communications security provisions are adequately audited and reviewed.

ACTIVITY(S): Development Contractor

EXPLANATIONS: Software which implements computer/communication security is particularly important. Any such software items must be adequately audited/reviewed as part of the trusted computer base. If the configured software item(s) are themselves classified, then appropriate security labels must be attached according to Air Force labeling requirements. Adequacy of such labeling procedures should be audited/reviewed.

GLOSSARY:

Security Provisions. The totality of threats, vulnerabilities, and protection mechanisms involved with determining whether computer/communications assets can be compromised through data, process, or abuseviolations. Security provisions exist across the administrative, system, and facility categories.

RESPONSE INSTRUCTIONS:

A/6: There is no requirement for security provisions to be implemented
in software.

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 012

QUESTION: The software configuration audit/review requirements for post deployment support are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The CRISP (first version) is required early in the life cycle, at least prior to full scale development. The O/S CMP is required prior to the end of the full scale development.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

QUESTION DATA SHEET

Question Number SCM(AR) - 013

QUESTION: The automated support tools for post deployment support of configuration audit/review are adequately addressed in the CRLCMP (CRISP and O/S CMP).

ACTIVITY(S): Operation Support

EXPLANATIONS: The CRISP and O/S CMP (or the JLC Computer Resources Life Cycle Management Plan - CRLCMP) are the key planning documents for operation support configuration management. The CRISP, O/S CMP, and CRLCMP are intended to be living documents, evolving to provide a current view of the configuration management features along with the evolution of the system. The use of automated support tools during development and transition of those tools for use during post deployment support is an important consideration for the overall enhancement of software supportability. The lack of such tools to assist in the audit and review of the various baselines should be considered a serious deficiency.

GLOSSARY:

RESPONSE INSTRUCTIONS:

RESPONSE RATIONALE:

RESPONSE SCORE: ________
(COMPLETELY DISAGREE = 1,2,3,4,5,6 = COMPLETELY AGREE)

ATTACHMENT A2

SUMMARY LIST OF QUESTIONS

This attachment contains a summary list of all Software Life Cycle Process questions. The questions are listed in the order in which they appear in Attachment A1.

SOFTWARE PROJECT MANAGEMENT PLANNING

SPM(PL)-001: QUESTION: Planning for computer resources has been adequate with respect to acquisition, development, logistics, and training.

SPM(PL)-002: QUESTION: Procurement planning for computer resources has been consistent with the system development and acquisition plan.

SPM(PL)-003: QUESTION: Planning for computer resources has been based upon an acquisition schedule with adequately specified milestones.

SPM(PL)-004: QUESTION: Computer resources have been adequately addressed as major considerations at procurement reviews, audits, and management evaluations.

SPM(PL)-005: QUESTION: Planned computer resources have been analyzed adequately by ensure conformance with stated operational and support requirements.

SPM(PL)-006: QUESTION: Procurement planning for software quality attributes has been adequately emphasized throughout the software life cycle acquisition.

SPM(PL)-007: QUESTION: Margins for reserve computer resource capacity to provide for later product improvements are adequate.

SPM(PL)-008: QUESTION: Acceptable techniques have been used to estimate and monitor software costs throughout the system life cycle.

SPM(PL)-009: QUESTION: The CRLCMP (CRISP, O/S CMP) contains adequate specifications of the acquisition requirements for computer resources.

SPM(PL)-010: QUESTION: The CRLCMP (CRISP, O/S CMP) adequately addresses the responsibilities and prodedures to ensure proper software configuration management throughout the system life cycle.

SPM(PL)-011: QUESTION: The project management responsibility for integrating computer resources into a system has remained centralized throughout the life of the system.

SPM(PL)-012: QUESTION: The CRWG organization has been adequate throughout the system life cycle.

SPM(PL)-013: QUESTION: The CRWG has had clearly specified responsibilities and appropriate authority to implement those responsibilities throughout the system life cycle.

SPM(PL)-014: QUESTION: The CRWG has properly assured that computer resources comply with established policy, procedures, plans, and standards.

SPM(PL)-015: QUESTION: Software quality assessment procedures have been adequately defined to meet management policies and appropriate regulations, conform to standards, and meet performance and quality requirements throughout the system life cycle.

SPM(PL)-016: QUESTION: Planning for DT&E of computer resources has been adequate throughout the system life cycle.

SPM(PL)-017: QUESTION: Planning for OT&E of computer resources has been adequate throughout the system life cycle.

SPM(PL)-018: QUESTION: Software standards have been adequately specified throughout the software life cycle.

SPM(PL)-019: QUESTION: The planning for organic and/or contractor support during post deployment software support has been adequate.

SPM(PL)-020: QUESTION: Contractual documents have explicitly established Government rights to all computer resources required to develop, operate, simulate, test, and support the software.

SPM(PL)-021: QUESTION: Planning for risk analysis to identify areas of computer resource risk has been adequate.

SPM(PL)-022: QUESTION: A mission/function matrix (or equivalent) clearly identifies primary functional capabilities to be implemented by the software.

SPM(PL)-023: QUESTION: Planning for interoperability with other systems has been adequately addressed.

SPM(PL)-024: QUESTION: Prior to each system milestone, interservicing potential and life cycle cost implications of software support options, have been appropriately addressed.

SPM(PL)-025: QUESTION: The procurement and operation support planning documents have been adequately updated as living documents throughout the system life cycle.

SPM(PL)-026: QUESTION: The principles and methodologies provided in the regulations have been appropriately incorporated into the software test and evaluation plans.

SPM(PL)-027: QUESTION: Planning for systematic, quantitative, and objectively reportable software tests has been adequate.

SPM(PL)-028: QUESTION: Planning for sharing of software test results across lifecycle phases and among test organizations has been adequate.

SPM(PL)-029: QUESTION: Tracking of computer resource utilization has been adequately planned.

SPM(PL)-030: QUESTION: The project software budget/cost variance (budgeted - actual) appears to be reasonable.

SPM(PL)-031: QUESTION: The project software schedule/cost variance (consumed - scheduled) appears to be resonable.

SPM(PL)-032: QUESTION: The cost and schedule contractual reporting requirements appear to be adequate.

SOFTWARE PROJECT MANAGEMENT ORGANIZATION STRUCTURE

SPM(OS)-001: QUESTION: The software requirements have been adequately allocated to elements of a Work Breakdown Structure (WBS).

SPM(OS)-002: QUESTION: The software related tasks are clearly identified in the WBS.

SPM(OS)-003: QUESTION: The key project personnel and their assignments in relation to the WBS software related tasks are clearly identified.

SPM(OS)-004: QUESTION: The coordination of modifications to the WBS among all activities has been adequate.

SPM(OS)-005: QUESTION: The procurement personnel staffing has had continuity throughout the software life cycle phases.

SPM(OS)-006: QUESTION: The ratio of experienced procurement project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

SPM(OS)-007: QUESTION: The number of procurement personnel has been adequate throughout the software life cycle phases.

SPM(OS)-008: QUESTION: The development contractor personnel staffing has had continuity throughout tCe software life cycle phases.

SPM(OS)-009: QUESTION: The ratio of experienced development contractor project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

SPM(OS)-010: QUESTION: The number of development contractor personnel has been adequate throughout the software life cycle phases.

SPM(OS)-011: QUESTION: The operation support personnel staffing has had continuity throughout the software life cycle phases.

SPM(OS)-012: QUESTION: The ratio of experienced operation support project personnel to the total number of project personnel has been adequate throughout the software life cycle phases.

SPM(OS)-013: QUESTION: The number of operation support personnel has been adequate throughout the software life cycle phases.

SPM(OS)-014: QUESTION: The internal interfaces among procurement organization elements have been adequate.

SPM(OS)-015: QUESTION: The internal interfaces among development contractor organization elements have been adequate.

SPM(OS)-016: QUESTION: The internal interfaces among operation support organization elements have been adequate.

SPM(OS)-017: QUESTION: The procurement physical organization structure has been adequate.

SPM(OS)-018: QUESTION: The development contractor physical organization structure has been adequate.

SPM(OS)-019: QUESTION: The operation support physical organization structure has been adequate.

SOFTWARE PROJECT MANAGEMENT DESIGN METHODS

SPM(DM)-001: QUESTION: The procurement design analysis studies have provided adequate design guidelines for the development contractor.

SPM(DM)-002: QUESTION: The standards for software design required by the procurement activity are adequate.

SPM(DM)-003: QUESTION: The software design methodology used by the development contractor is adequate.

SPM(DM)-004: QUESTION: The design standards and methods adopted for use by the operation support activity during post deployment software support are adequate.

SPM(DM)-005: QUESTION: The System Design Review process has been adequate.

SPM(DM)-006: QUESTION: The software requirements appear to be reasonable.

SPM(DM)-007: QUESTION: The number of software requirements which cannot be traced to an end item product is minimal.

SPM(DM)-008: QUESTION: The number of software requirements which cannot be tested are minimal.

SPM(DM)-009: QUESTION: The profile of changes to software requirements is reasonable.

SPM(DM)-010: QUESTION: The profile of unresolved software review action items is reasonable.

SPM(DM)-011: QUESTION: The development contractor requirements analysis process has been adequate.

SPM(DM)-012: QUESTION: The development contractor top level design process has been adequate.

SPM(DM)-013: QUESTION: The development contractor detailed design process has been adequate.

SPM(DM)-014: QUESTION: The design completion of CSCIs relative to the software life cycle development schedule has been reasonable.

SPM(DM)-015: QUESTION: The development contractor monitor of the subcontractor software design process has been adequate.

SPM(DM)-016: QUESTION: The design specifications for the software products contain adequate information to implement the software with the required functionality and within the schedule and budget requirements.

SPM(DM)-017: QUESTION: The operation support concept for design of software revisions during post deployment software support is adequate.

SPM(DM)-018: QUESTION: The operation support concept for design review during post deployment software support is adequate.

SOFTWARE PROJECT MANAGEMENT IMPLEMENTATION METHODS

SPM(IM)-001: QUESTION: The procurement activity has adequately monitored the implementation of the software design specifications.

SPM(IM)-002: QUESTION: The procurement test organization interface with the development contractor is adequate enough to assure success of the system integration tests.

SPM(IM)-003: QUESTION: The operation support activity has been actively involved with the development contractor's software implementation in order to learn the software prior to officially accepting software support responsibility.

SPM(IM)-004: QUESTION: The standards for software implementation required by the procurement activity are adequate.

SPM(IM)-005: QUESTION: The implementation methodology used by the development contractor is adequate.

SPM(IM)-006: QUESTION: The implementation standards and methods adopted for use by the operation support activity during post deployment software support are adequate.

SPM(IM)-007: QUESTION: The development contractor monitor of subcontractor software implementation process has been adequate.

SPM(IM)-008: QUESTION: The implementation completion of CSCIs has been reasonable relative to the software life cycle schedule.

SPM(IM)-009: QUESTION: The procurement software project management support tool environment is adequate.

SPM(IM)-010: QUESTION: The development contractor software project management support tool environment is adequate.

SPM(IM)-011: QUESTION: The development contractor software configuration management support tool environment is adequate.

SPM(IM)-012: QUESTION: The development contractor system software tool environment is adequate.

SPM(IM)-013: QUESTION: The development contractor application software test environment is adequate.

SPM(IM)-014: QUESTION: The operation support software support tool environment is adequate.

SPM(IM)-015: QUESTION: The operation support concept for implementation of software revisions during post deployment software support is adequate.

SPM(IM)-016: QUESTION: The operation support concept for implementation audits and reviews during post deployment software support is adequate.

SOFTWARE PROJECT MANAGEMENT TEST STRATEGIES

SPM(TS)-001: QUESTION: The TEMP adequately describes the software test and evaluation process.

SPM(TS)-002: QUESTION: The software test process for DT&E has followed the guidelines in the TEMP.

SPM(TS)-003: QUESTION: The software test process for OT&E has followed the guidelines in the TEMP.

SPM(TS)-004: QUESTION: The implementation of the software test process by DT&E and OT&E organizations has been adequate.

SPM(TS)-005: QUESTION: The test organizations have incorporated a strategy in their software test processes for coordination and sharing of test plans, procedures, and results.

SPM(TS)-006: QUESTION: The requirements for the development contractor software test strategy are clearly specified in the RFP, SOW, and/or CDRLs.

SPM(TS)-007: QUESTION: The use of an organization for software test IV&V support has been effective.

SPM(TS)-008: QUESTION: The overall planning for software testing has been adequate.

SPM(TS)-009: QUESTION: The software test approach and methodologies employed are clearly described in the software test docmentation and appear to be effective.

SPM(TS)-010: QUESTION: The software features to be tested and not to be tested are clearly described in the software test documentation.

SPM(TS)-011: QUESTION: The traceability of software features tested/not tested to the software functional requirements is described in the software test documentation.

SPM(TS)-012: QUESTION: The software test deliverables are adequately specified in the software test documentation.

SPM(TS)-013: QUESTION: The software test criteria used to determine whether each test has passed or failed is clearly specified in the software test documentation.

SPM(TS)-014: QUESTION: The personnel groups responsible for the software tests are adequately identified in the software test documentation.

SPM(TS)-015: QUESTION: The high risk assumptions of the software testing approach along with contingency plans for each such assumption is adequately described in the software test documentation.

SPM(TS)-016: QUESTION: The schedule for software test milestones is adequately specified in the software test documentation.

SPM(TS)-017: QUESTION: Software testing is adequately prioritized in the software test approach according to mission criticality concerns.

SPM(TS)-018: QUESTION: The software test environment is adequately identified in the software test documentation and is adequate for accomplishing the required testing.

SPM(TS)-019: QUESTION: The configuration management of the software test process is adequate.

SPM(TS)-020: QUESTION: The transition of the software test strategy from the development contractor to the operation support activity has been adequately addressed in the software test documentation and the procurement software test plans.

SOFTWARE PROJECT MANAGEMENT PROJECT INTERFACES

SPM(PI)-001: QUESTION: The system program office external interfaces are adequate.

SPM(PI)-002: QUESTION: The implementing command external interfaces are adequate.

SPM(PI)-003: QUESTION: The using command external interfaces are adequate.

SPM(PI)-004: QUESTION: The supporting command external interfaces are adequate.

SPM(PI)-005: QUESTION: The training command external interfaces are adequate.

SPM(PI)-006: QUESTION: The development contractor external interfaces are adequate.

SPM(PI)-007: QUESTION: The Development Test and Evaluation (DT&E) organization external interfaces are adequate.

SPM(PI)-008: QUESTION: The Operational Test and Evaluation (OT&E) organization external interfaces are adequate.

SPM(PI)-009: QUESTION: The Computer Resources Working Group (CRWG) external interfaces are adequate.

SPM(PI)-010: QUESTION: The Test Planning Working Group (TPWG) external interfaces are adequate.

SPM(PI)-011: QUESTION: The Interface Control Working Group (ICWG) external interfaces are adequate.

SPM(PI)-012: QUESTION: The Independent Verification and Validation (IV&V) agency external interfaces are adequate.

SPM(PI)-013: QUESTION: The software configuration management interfaces among all activities' management components for the subject system are adequate.

SPM(PI)-014: QUESTION: The software quality assurance management interfaces among all activities' management components for the subject system are adequate.

SPM(PI)-015: QUESTION: The contract management interfaces among all activities' management components for the subject system are adequate.

SPM(PI)-016: QUESTION: The interservice external interfaces with all activities' management components are adequate.

SOFTWARE CONFIGURATION MANAGEMENT IDENTIFICATION

SCM(ID)-001: QUESTION: The procurement policy, standards, and conventions applied to the identification of software configuration items are adequate.

SCM(ID)-002: QUESTION: The procurement identification of deliverable software configuration items is adequate.

SCM(ID)-003: QUESTION: The procurement activity identification of the software configuration baselines is adequate.

SCM(ID)-004: QUESTION: The system/segment specification adequately identifies elements of the software functional baseline.

SCM(ID)-005: QUESTION: The performance requirement specifications adequately identify elements of the software allocated baseline.

SCM(ID)-006: QUESTION: The implementation specifications adequately identify elements of the software product baseline.

SCM(ID)-007: QUESTION: The identifier characteristics for software configuration item names are adequate.

SCM(ID)-008: QUESTION: The development contractor internal identifier naming standards/conventions satisfy contractual regulations.

SCM(ID)-009: QUESTION: Development contractor identification standards and conventions can be transitioned to operation support standards and conventions.

SCM(ID)-010: QUESTION: Development contractor deliverable configuration items are named to adequately identify multiple versions and variations.

SCM(ID)-011: QUESTION: Development contractor identification procedures are structured. to permit easy addition, deletion, or modification or configured items at any hierarchical level.

SCM(ID)-012: QUESTION: Development contractor identification procedures for addition, deletion, and modification of configured items are being followed.

SCM(ID)-013: QUESTION: The physical medium of configured items is adequately described by the development contractor software component/item identification scheme.

SCM(ID)-014: QUESTION: The development contractor software identifiers adequately distinguish among different states (e.g., source, object, load, core images, listings) of the software.

SCM(ID)-015: QUESTION: The development contractor software change control form identifiers are adequate.

SCM(ID)-016: QUESTION: Subcontractor configuration item identification practices are monitored by the development contractor.

SCM(ID)-017: QUESTION: The documentation which collectively identifies the content of a configuration item is adequate.

SCM(ID)-018: QUESTION: Software configured items which implement safety provisions are adequately identified.

SCM(ID)-019: QUESTION: Software configured items which implement computer/communications security provisions are adequately identified.

SCM(ID)-020: QUESTION: The identification requirements for post deployment support are adequately addressed in the CRLCMP (CRISP, O/S CMP).

SCM(ID)-021: QUESTION: The automated support tools for post deployment support of configuration identification are adequately addressed in the CRLCMP (CRISP, O/S CMP).

SOFTWARE CONFIGURATION MANAGEMENT CONTROL

SCM(CC)-001: QUESTION: The procurement policy, standards, and conventions applied to the control of software configuration items are adequate.

SCM(CC)-002: QUESTION: The procurement activity has implemented adequate software configuration management, based upon regulations, to control the functional and physical characteristics of all CSCIs.

SCM(CC)-003: QUESTION: The procurement configuration management planning documents contain sufficient guidance for configuration control.

SCM(CC)-004: QUESTION: The development contractor configuration management activities are adequately monitored by the procurement activity.

SCM(CC)-005: QUESTION: The procurement configuration control procedures for the Class I and Class II changes (or equivalent categories) are adequate.

SCM(CC)-006: QUESTION: The use of deviations and waivers by the development contractor which could affect the supportability of the software has been adequately controlled by the procurement activity.

SCM(CC)-007: QUESTION: The procurement baseline control forms are adequate.

SCM(CC)-008: QUESTION: The procurement configuration control board procedures are adequate.

SCM(CC)-009: QUESTION: The procurement procedures for turnover and transfer of configuration control to the operation support activity has been adequately planned.

SCM(CC)-010: QUESTION: Development contractor configuration control standards and conventions can be transitioned to operation support standards and conventions.

SCM(CC)-011: QUESTION: The development contractor configuration control board has an adequate interface with the procurement activity configuration control board.

SCM(CC)-012: QUESTION: The development contractor configuration control board procedures are adequate to distinguish between hardware and software failures.

SCM(CC)-013: QUESTION: The development contractor configuration control procedures can be transitioned to or are compatible with the operation support activity planned configuration control procedures.

SCM(CC)-014: QUESTION: The development contractor automated support tools for configuration control of baselines and internal development identifications is adequate.

SCM(CC)-015: QUESTION: The development contractor software change control forms are adequate.

SCM(CC)-016: QUESTION: Subcontractor configuration item control practices are monitored by the development contractor.

SCM(CC)-017: QUESTION: Configured items which implement safety provisions are adequately controlled.

SCM(CC)-018: QUESTION: Software configured items which implement computer/communications security provisions are adequately controlled.

SCM(CC)-019: QUESTION: Distribution of configured item changes from the operation support activity to the field is adequately controlled.

SCM(CC)-020: QUESTION: The configuration control responsibility for integrating computer resources into the system has remained centralized throughout the life of the system.

SCM(CC)-021: QUESTION: The configuration control requirements for post deployment support are adequately addressed in the CRLCMP (CRISP [illegible]).

SCM(CC)-022: QUESTION: The operation support configuration control boards are adequately defined to handle software changes.

SCM(CC)-023: QUESTION: The automated support tools for post deployment support of configuration control are adequately addressed in the CRLCMP (CRISP and O/S CMP).

SOFTWARE CONFIGURATION MANAGEMENT STATUS ACCOUNTING

SCM(SA)-001: QUESTION: The procurement policy, standards, and conventions applied to the configuration status accounting of software configuration items are adequate.

SCM(SA)-002: QUESTION: The procurement activity has implemented adequate software configuration status accounting, based upon regulations, to report the functional and physical characteristics of all CSCIs.

SCM(SA)-003: QUESTION: The procurement configuration management planning documents contain sufficient guidance for configuration status accounting.

SCM(SA)-004: QUESTION: The procurement activity configuration status accounting procedures are adequate.

SCM(SA)-005: QUESTION: The development contractor internal configuration status accounting procedures are adequate.

SCM(SA)-006: QUESTION: Development contractor configuration status accounting standards and conventions can be transitioned to operation support standards and conventions.

SCM(SA)-007: QUESTION: The development contractor configuration status accounting has an adequate interface with the procurement activity configuration status accounting.

SCM(SA)-008: QUESTION: The development contractor configuration status accounting procedures can be transitioned to or are compatible with the operation support activity planned configuration status accounting procedures.

SCM(SA)-009: QUESTION: The development contractor automated support tools for configuration status accounting of baselines and internal development identifications are adequate.

SCM(SA)-010: QUESTION: The development contractor software configuration status accounting forms are adequate.

SCM(SA)-011: QUESTION: Subcontractor configuration item configuration status accounting procedures are monitored by the development contractor.

__SCM(SA)-012: QUESTION:__ Status of software configuration items which implement safety provisions is adequately reported.

__SCM(SA)-013: QUESTION:__ Status of software configured items which implement computer/communications security provisions is adequately reported.

__SCM(SA)-014: QUESTION:__ The configuration status accounting requirements for post deployment support are adequately addressed in the CRLCMP (CRISP and O/S CMP).

__SCM(SA)-015: QUESTION:__ The operation support configuration status accounting procedures are adequately defined to handle software change reporting requirements.

__SCM(SA)-016: QUESTION:__ The automated support tools for post deployment support of configuration status accounting are adequately addressed in the CRLCMP (CRISP and O/S CMP).

SOFTWARE CONFIGURATION MANAGEMENT AUDIT AND REVIEW

__SCM(AR)-001: QUESTION:__ The procurement policy, standards, and conventions applied to the audit and review of software configuration items are adequate.

__SCM(AR)-002: QUESTION:__ The procurement activity has implemented adequate software configuration audit/review based upon regulations to control the functional and physical characteristics of all CSCIs.

__SCM(AR)-003: QUESTION:__ The procurement configuration management planning documents contain sufficient guidance for configuration audit/review.

__SCM(AR)-004: QUESTION:__ The conduct of formal reviews and audits follows a format based on the checklists from MIL-STD-1521B, appropriately tailored for the specific software audit/review.

__SCM(AR)-005: QUESTION:__ The software product acceptance requirements are adequate.

__SCM(AR)-006: QUESTION:__ The development contractor internal configuration audit/review process facilitates the development of high quality production software.

__SCM(AR)-007: QUESTION:__ Configuration audit/review interfaces among procurement, development contractor, and operation support activities are adequate.

__SCM(AR)-008: QUESTION:__ The development contractor configuration management tool support facilitates the audit/review of the process by which changes are incorporated into configuration identifications.

SCM(AR)-009: QUESTION: Subcontractor configuration item audit/review practices are monitored by the development contractor.

SCM(AR)-010: QUESTION: Configured items which implement safety provisions are adequately audited and reviewed.

SCM(AR)-011: QUESTION: Software configured items which implement computer/communications security provisions are adequately audited and reviewed.

SCM(AR)-012: QUESTION: The software configuration audit/review requirements for post deployment support are adequately addressed in the CRLCMP (CRISP and O/S CMP).

SCM(AR)-013: QUESTION: The automated support tools for post deployment support of configuration audit/review are adequately addressed in the

ATTACHMENT A3

GLOSSARY OF TERMS

A3.1 INTRODUCTION.

a. The glossary of terms for the RAMSS has varied as the methodology development has progressed. Refer to BDM/A-84-322-TR (Final) dated September 28, 1984, for a complete glossary of terms relating to risk assessment.

b. Some terms have more than one description; when this is the case, the description either:

(1) Are significantly different between sources (though the effective meaning may be not much different)

(2) Are used differently (different users or technical language)

(3) May be found within the context of a different source

(4) Have real differences in meaning.

Both DoD and non-DoD (e.g., FIPS PUBs, NBS Special Publications) sources are used. The non-DoD sources and terms are not mandated for our use, but are rather included for breadth of understanding, for those relevant terms commonly used with the non-DoD governmental and/or private sectors.

c. The source of each description is indicated by a symbol in parentheses before that source's term description:

$TERM_1$

($SYMBOL_{1.1}$)

$Description_{1.1}$...

($SYMBOL_{1.2}$)

$Description_{1.2}$...

•

•

•

($SYMBOL_{1.n}$)

$Description_{1.n}$...

$TERM_2$

•

•

•

$TERM_N$

The symbols used and corresponding sources are:

(AFOTECP1)	AFOTECP 800-2, Volume I, 10 Nov 82, "Software Test Manager's Guide."
(AFOTECP3)	AFOTECP 800-2, Volume III, 1 Jan 84, "Software Maintainability Evaluator's Guide."
(AFOTECP5)	AFOTEC 800-2, Volume V, 25 Jul 83, "Software Support Facility Evaluation--User's Guide."
(AFR55-43)	Air Force Regulation 55-43, "Management of Operational Test and Evaluation", 28 Jun 1985.
(AFR800-14)	Air Force Regulation 800-14, Volume I, "Management of Computer Resources in Systems," 12 Sep 75.
(DoD480A)	DoD Standard 480A, "Configuration Control - Engineering Changes, Deviations and Waivers", 12 Apr 78.
(ROWE)	Rowe, William, <u>An Anatomy of Risk</u>, John Wiley, 1977.
(CURRENT)	Current document definition.

A3.2 GLOSSARY OF TERMS FOR DEVELOPING AND IMPLEMENTING A RISK ASSESSMENT METHODOLOGY FOR SOFTWARE SUPPORTABILITY.

Allocated Baseline

(DoD480A)
See Baseline.

Allocated Configuration Identification

(DoD480A)
Current, approved performance oriented specifications governing the development of configuration items that are part of a higher level CI, in which each specification (1) defines the functional characteristics that are allocated from those of the higher level CI, (2) establishes the tests required to demonstrate achievement of its allocated functional characteristics, (3) delineates necessary interface requirements with other associated configuration items, and (4) establishes design constraints, if any, such as component standardization, use of inventory items, and integrated logistic support requirements.

Application Software

(AFOTECP5)
The software written by software support personnel, or purchased from a contractor, used directly in supporting ECSs. It is normally used for simulation, testing, and ECS code development.

Automated Software Development Tool

(AFOTECP5)
A component of System Software that assists in the design, implementation, documentation, and verification of ECS software.

Availability

(AFR800-14)
A measure of the degree to which an item is in the operable and commitable state at the start of the mission, when the mission is called for at an unknown (random) point in time. (MIL-STD-721)

(AFOTECP5)
The probability that a system is operating satisfactorily at any point in time when used under stated conditions.

Available Person Time (APT)

(CURRENT)
The software support person-months available for a particular software release computed as the product of the release duration

in months, the number of support personnel, and the percentage of the time those personnel are dedicated to the subject software release (versus shared across other releases or other software systems). This time includes overhead activity directly related to the subject release. The release duration is the release engineering completion date minus the release start date.

Baseline

(DoD480A)
A configuration identification document or a set of such documents formally designated and fixed at a specific time during a CI's life cycle. Baselines, plus approved changes from those baselines, constitute the current configuration identification. For configuration management there are three baselines, as follows:

a) Functional Baseline. The initial approved functional configuration identification.

b) Allocated Baseline. The initial approved allocated configuration identification.

c) Product Baseline. The initial approved or conditionally approved product configuration identification.

(ROWE)
A known reference used as a guide for further development activities.

Baseline Profile

(CURRENT)
See Baseline Software Change Profile.

Baseline Software Change Profile

(CURRENT)
The set of numbers (or any subset) determined by specifying the number of requests per release for each request category. A request category is the triple (type, priority, complexity) where type is conversion, enhancement, or correction; priority is emergency, urgent, or normal; and complexity is high, medium, low.

Baseline Software Supportability Estimate

(CURRENT)
See User/Supporter Baseline Estimate

Block Release

(CURRENT)
See Release.

Change Control

(DoD480A)
See Configuration Control

Complexity of MA

(CURRENT)
See Maintenance Complexity

Computer Program

(AFR800-14)
A series of instructions or statements in a form acceptable to an electronic computer, designed to cause the computer to execute an operation or operations.

Computer Program Configuration Item (CPCI)

(CURRENT)
See Computer Software Configuration Item

Computer Resources

(CURRENT)
The totality of computer hardware, computer software, personnel, documentation, supplies, and services.

(AFR800-14)
The totality of computer equipment, computer programs, associated documentation, contractual services, personnel and supplies.

Computer Resources Integrated Support Plan (CRISP)

(AFR55-33)
The CRISP identifies organizational relationships and responsibilities for the management and technical support of computer resources. It functions during the full-scale development (FSD) phase to identify computer resources necessary to support computer programs after program management responsibility and system turnover are transferred. After the transfer, the CRISP continues to function as the basic agreement between the supporting and using commands for management and support of computer resources.

Computer Resources Working Group (CRWG)

(CURRENT)
A group comprised of all the participating commands (for a particular system) which writes and updates the Computer Resources Integrated Support Plan (CRISP). The group insures that necessary elements of the CRISP are included in transfer and turnover agreements.

Computer Software Configuration Item (CSCI)

(CURRENT)
See Configuration Item

Configuration Audit

(CURRENT)
The process of verifying that all required configuration items have been produced, that the current version agrees with specified requirements, that the technical documentation completely and accurately describes the configuration items, and that all change requests have been resolved.

Configuration Control

(DoD480A)
The systematic evaluation, coordination, approval or disapproval, and implementation of all approved changes in the configuration of a configuration item after formal establishment of its configuration identification.

Configuration Identification

(DoD480A)
The current approved or conditionally approved technical documentation for a configuration item as set forth in specifications, drawings and associated lists, and documents referenced therein.

Configuration Index

(CURRENT)
This document, produced by the development contractor, reports the current status of configuration item development in terms of specifications and other documents that depend on the configuration, such as qualification Test Plans and Procedures, User Manuals, and the Version Description Document. It lists all ECPs and SCNs incorporated, approved ECPs not yet incorporated, and other data.

Configuration Item (CI)

(AFR800-14)
An aggregation of equipment/software, or any of its discrete portions, which satisfies an end use function and is designated by the Government for configuration management. CIs may vary widely in complexity, size and type, from an aircraft or electronic system to a test meter or round of ammunition. During development and initial production, CIs are only those specification items that are referenced directly in a contract (or an equivalent in-house agreement). During the operation and maintenance period,

any repairable item designated for separate procurement is a configuration item (AFR 65-3).

Configuration Management (CM)

(DoD480A)
A discipline applying technical and administrative direction and surveillance to (1) identify and document the functional and physical characteristics of a configuration item, (2) control changes to those characteristics, and (3) record and report change processing and implementation status.

Configuration Management Plan (CMP)

(CURRENT)
A document which describes project responsibilities and procedures for implementing CM.

Configuration Management System (CMS)

(AFOTECP5)
A system applying technical and administrative direction and surveillance to identify and document the functional and physical characteristics of a configuration item; to control changes to those characteristics and to record and report change processing and implementation status.

Configuration Status Accounting

(DoD480A)
The recording and reporting of the information that is needed to manage a configuration effectively, including a listing of the approved configuration identification, the status of proposed changes to the configuration, and the implementation status of approved changes.

Consistency

(CURRENT)
A measure of the extent the software products correlate and contain uniform notation, terminology, and symbology.

Conversion (Adaptive) MA

(CURRENT)
See Maintenance Type.

Corrective MA

(CURRENT)
See Maintenance Type.

Critical Issues

(AFOTECP1)
Those aspects of a system's capability, either operational, technical, or other, that must be questioned before system's overall worth can be estimated and that are of primary importance to the decision authority in reaching a decision to allow the system to advance into the next acquisition phase (DoD Directive 5000.3).

Data Item Description

(AFR800-14)
A form which specifies an item of data required to be furnished by a contractor. This form specifically defines the content, preparation instructions, format and intended use of each data product.

Descriptiveness

(CURRENT)
A measure of the extent that software products contain information regarding its objectives, assumptions, inputs, processing, outputs, components, revision status, etc.

Development Contractor Activity

(CURRENT)
Those organizations responsible for development of a system in order to achieve an initial operational capability. Organizations include the prime development contractor and any subcontractors to the prime contractor.

Documentation

(AFOTECP5)
All of the written work describing operating and maintenance procedures for a system.

Embedded Computer Resources

(AFOTECP1)
Computer resources incorporated as integral parts of, dedicated to, required for direct support of, or for the upgrading or modification of major or less than major system(s) (excludes ADP resources as defined and administered under AFR 300 series) (USAF/RD/LE Policy letter, 13 October 1981).

Embedded Computer System (ECS)

(AFOTECP1)
a) A computer that is integral to an electromechanical system and that has the following key attributes:

(1) Physically incorporated into a large system whose primary function is not data processing

(2) Integral to, or supportive of, a larger system from a design, procurement, and operations viewpoint

(3) Inputs include target data, environmental data, command and control, etc.

(4) Outputs include target information, flight information, control signals, etc.

b) In general, an embedded computer system (ECS) is developed, acquired, and operated under decentralized management (DoD Directives 5000.1, 5000.2).

Emergency MA

(CURRENT)
See Maintenance Priority.

Engineering Change Proposal (ECP)

(AFR55-43)
A formal, priced document (DD Form 1692) used to propose changes to the contact provisions and scope, if not partially waived (see Contract Change Proposal), and to the configuration item baseline identification especially when related equipment, critical issues, interfaces, or technical manuals are affected or retrofit is involved. See MIL-STDs 480, 481, and 483; and AFR 400-3.

Enhancement (Perfective) MA

(CURRENT)
See Maintenance Type.

Estimated Person Months Per Change

(CURRENT)
See Person Months Per Change

Estimated Risk

(CURRENT)
See Software Supportability Risk

Estimation

(ROWE)
The assignment of probability measures to a postulated future event.

Evaluated Person Months Per Change

(CURRENT)
See Person Months Per Change

Evaluated Risk

(CURRENT)
See Software Supportability Risk.

Evaluation

(ROWE)
Comparison of an activity performance with the objectives of the activity and assignment of a success measure to that performance.

Evaluation Criteria

(AFOTECP1)
Standards by which achievement of required operational effectiveness/suitability characteristics or resolution of technical or operational issues may be judged. For full-scale development and beyond, evaluation criteria must include quantitative goals (the desired value) and thresholds (the value beyond which the characteristic is unsatisfactory) whenever possible (DoD Directive 5000.3).

Expandability

(CURRENT)
A measure of the extent that a physical change to information, computational functions, data storage, or execution time can be easily accomplished once the nature of what is to be changed is understood.

(AFOTECP5)
A measure of the ease with which the functional capability of computer hardware or software may be expanded.

Facility

(AFOTECP5)
The physical plant and the services it provides; specific examples are physical space, electrical power, physical and electromagnetic (TEMPEST) security, environmental control, fire safety provisions, and communications availability.

Firmware

(AFOTECP1)
a) Computer programs and data loaded in a class of memory that cannot be dynamically modified by the computer during processing.
b) Hardware that contains a computer program and data that cannot be changed in its application environment.

Note 1. Computer programs and data contained in firmware are classified as software; the circuitry containing the computer program and data is classified as hardware (Data and Analysis Center for Software).

Functional Baseline

(DoD480A)
See Baseline.

Functional Configuration Audit (FCA)

(DoD480A)
The formal examination of functional characteristics test data for a configuration item, prior to acceptance, to verify that the item has achieved the performance specified in its functional or allocated configuration identification.

Functional Configuration Identification

(DoD480A)
The current approved technical documentation for a configuration item which prescribes (1) all necessary functional characteristics, (2) the tests required to demonstrate achievement of specified functional characteristics, (3) the necessary interface characteristics with associated CI's, (4) the CI's key functional characteristics and its key lower level CI's, if any, and (5) design constraints, such as envelope dimensions, component standardization, use of inventory items, integrated logistics support policies.

High Complexity MA

(CURRENT)
See Maintenance Complexity.

Historical Maintenance Profile

(CURRENT)
A histogram of data on software system releases, with the x-axis representing discrete ranges of (available) person-months per change and the y-axis representing the number of software system

releases that fall into each x-axis discrete range. For purposes of analysis or illustration, the axes may be reversed.

Independent Verification and Validation (IV&V)

(AFOTECP1)
An independent assessment process structured to ensure that computer programs fulfill the requirements stated in system and subsystem specifications and satisfactorily perform the functions required to meet the user's and supporter's requirements. IV&V consists of three essential elements: independent, verification, and validation:

(1) Independent. An organization/agency which is separate from the software development activity from a contractual and organizational standpoint.

(2) Verification. The evaluation to determine whether the products of each step of the computer program development process fulfill all requirements levied by the previous step.

(3) Validation. The integration, testing, and/or evaluation activities carried out at the system/subsystem level to evaluate the developed computer program against the system specifications and the user's and supporter's requirements (AFR 88-14).

Initial Operational Capability (IOC)

(CURRENT)
That point in a system's life cycle when the agreed upon number of production systems has been delivered to the user (using command) for operational use.

Instrumentation

(CURRENT)
A measure of the extent that software products contain aids that enhance testing.

Interface Control Working Group (ICWG)

(MIL-STD-483)
For programs which encompass a system/HWCI/CSCI design cycle, an ICWG normally is established to control interface activity between contractors or agencies, including resolution of interface problems and documentation of interface agreements.

Interoperability

(AFOTECP5)
A measure of the degree to which computer hardware/software can interface to and operate with other similar computer hardware/software.

Low Complexity MA

(CURRENT)
See Maintenance Complexity.

Maintainability

(AFOTECP5)
The probability that a system out of service for maintenance can be properly repaired and returned to service in a stated elapsed time.

Maintenance Complexity

(CURRENT)
The general degree of difficulty to complete a maintenance request: high, medium, low.

High: An MA where changes are in requirements, design, code, and test; or greater than 10 percent of CSCI is affected; or several modules are affected by the change (global changes); or the technical nature of the change requires highly specialized personnel skills; or the level of effort by personnel is large.

Medium: An MA where changes are in design, code and test; or between 1 percent and 10 percent of CSCI is affected; or at least two modules are affected by the change (semi-local); or the level of effort by personnel is average.

Low: An MA where changes are isolated to only one unit (e.g., one module/compilation unit) of code; or no more than 1 percent of CSCI is affected; or the level of effort by personnel is minimal.

Maintenance Documentation

(AFOTECP5)
The documentation that describes the maintenance of computer system hardware and software.

Maintenance Priority

(CURRENT)
The criticality of the maintenance request in order to preserve mission readiness; emergency, urgent, normal.

Emergency; An MA requiring all available personnel's dedicated effort to correct the problem as soon as possible (e.g., 24 hours); MIL-STD-1679 severity code 1 or 2: mission termination or severe degradation.

Urgent: An MA requiring next "block release" turnaround; MIL-STD-1679 severity code 3: mission impact.

Normal: An MA not in the Emergency or Urgent categories; MIL-STD-1679 severity code 4 or 5: mission inconvenience.

Maintenance Profile

(CURRENT)
See Historical Maintenance Profile.

Maintenance Request Category

(CURRENT)
The identification of a maintenance request by specification of the maintenance priority, type, and complexity.

Maintenance Type

(CURRENT)
The type of maintenance actions required to complete a maintenance request: conversion, enhancement, correction.

Conversion (Adaptive) MA: Any change/effort to a software system which is initiated as a result of changes in the environment (e.g., hardware, system software) in which the software system must operate.

Enhancement (Perfective) MA: Any change, insertion, deletion, modification, or extension made to a software system to meet the evolving needs of the user.

Corrective MA: Any change which is necessitated by actual faults (induced or residual) in a software system.

Medium Complexity MA

(CURRENT)
See Maintenance Complexity.

Modularity

(CURRENT)
A measure of the extent that a logical partitioning of software products into parts, components, and/or modules has occurred.

Normal MA

(CURRENT)
See Maintenance Priority.

Operation Support Activity

(CURRENT)
Those organizations responsible for post deployment operation and support of a system. Organizations include the using command, supporting command, contractors (if used), and test and evaluation agencies (if used).

Operational Effectiveness

(AFOTECP1)
The overall degree of mission accomplishment of a system used by representative personnel in the context of the organization, doctrine, tactics, threat (including countermeasures and nuclear threats), and environment in the planned operational employment of the system (DoD Directive 5000.3).

Operational Suitability

(AFOTECP1)
The degree to which a system can be satisfactorily placed in field use, with consideration being given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistic supportability, and training requirements (DoD Directive 5000.3).

Person-Months per Change (PMPC)

(CURRENT)
Available PMPC: Raw personnel resources workload to support a user/supporter baseline workload estimate of a specified number of changes. Computed as the number of full-time equivalent personnel times the release cycle in months divided by the total number of changes.

Estimated PMPC: An estimate of a personnel resources workload required to support the user/supporter baseline estimate. This estimate is computed by using a regression equation whose coefficients are derived from historical maintenance release data.

Evaluated PMPC: A realistic estimate of personnel resources workload effectiveness to support the user/supporter baseline estimate as derived from an evaluation of the software supportability characteristics.

Personnel

(CURRENT)
See Support Personnel.

Personnel Skill Level

(CURRENT)
A subjective integer rating from 1 (lowest) to 5 (highest) of software support personnel experience, education, and specific task responsibility capabilities.

Physical Configuration Audit (PCA)

(DoD480A)
The formal examination of the "as-built" configuration of a unit of a CI against its technical documentation in order to establish the CI's initial product configuration identification.

Priority

(CURRENT)
See Maintenance Priority.

Probability

(ROWE)
A numerical property attached to an activity or event whereby the likelihood of its future occurrence is expressed or clarified.

Probability Distribution

(ROWE)
The representation of a repeatable stochastic process by a function satisfying the axioms of probability theory.

Probability of Occurrence

(ROWE)
The probability that a particular event will occur, or will occur in a given interval.

Procurement Activity

(CURRENT)
Those government organizations responsible for assuring delivery of a production system. Organizations include the program office, implementing command, development and operational test and evaluation agencies, and appropriate independent verification and validation agencies if used.

Product Baseline

(DoD480A)
See Baseline.

Product Configuration Identification

(DoD480A)
The current approved or conditionally approved technical documentation which defines the configuration of a CI during the production, operation, maintenance, and logistics support phases of its life cycle, and which prescribes (1) all necessary physical or form, fit and function characteristics of a CI, (2) the selected functional characteristics designated for production acceptance testing, and (3) the production acceptance tests.

Program Management Directive (PMD)

(AFR800-14)
The official HQ USAF management directive used to provide direction to the implementing and participating commands and satisfy documentation requirements. It will be used during the entire acquisition cycle to state requirements and request studies as well as initiate, approve, change, transition, modify or terminate programs. The content of the PMD, including the required HQ USAF review and approval actions, is tailored to the needs of each individual program (AFR 800-2).

Program Management Plan (PMP)

(AFR800-14)
The document developed and issued by the Program Manager which shows the integrated time-phased tasks and resources required to complete the task specified in the PMD. The PMP is tailored to the needs of each individual program (AFR 800-2).

Program Management Responsibility Transfer (PMRT)

(AFR800-14)
That point in time when the designated Supporting Command accepts program management responsibilities from the Implementing Command. This includes logistic support and related engineering and procurement responsibilities (AFR 800-4).

Program Support Tools

(AFOTECP3)
General debug aids, test/retest software, trace software/hardware features, use of compiler/link editor, library management/configuration management/text editor/display software tools.

Program Test Plan

(AFOTECP3)
Set of descriptions and procedures for how the program is to be (or can be, or has been) tested.

Quality Assurance (QA)

(CURRENT)
All actions that are taken to assure that a development organization delivers products that meet performance requirements and adhere to standards and procedures.

Release

(CURRENT)
A version of a software system representing either the initial baseline configuration or an update to a previous version that incorporates a defined set of software change requests. Each release becomes a new baseline configuration.

Release Engineering Completion Data

(CURRENT)
The date when the software engineering activity for a release is complete. The software engineering activity includes configuration management, quality assurance, and software maintenance project phases of requirements, design, code, unit test, integration test, and operational test. Activity including "kit proofing," prom burning, and in general technical order modifications which typically occur between engineering completion and field implementation (distribution) is not included.

Release Field Date

(CURRENT)
The date when a software system release is officially distributed and implemented in the field for operational use.

Release ID

(CURRENT)
A unique identifier for a software system release.

Release Start Date

(CURRENT)
The date when major analysis activity related to a specified release begins for which software support resources are required.

Reliability

(ROWE)
The probability that the system will perform its required functions under given conditions for a specified operating time.

Risk

(ROWE)
The potential for realization of unwanted, negative consequences of an event.

Risk Acceptance

(ROWE)
Willingness of an individual, group, or society to accept a specific level of risk to obtain some gain or benefit.

Risk Acceptance Function

(ROWE)
A subjective operator relating the levels of probability of occurrence and value of a consequence to a level of risk acceptance.

Risk Acceptance Level

(ROWE)
The acceptable probability of occurrence of a specific consequence value to a given risk agent.

Risk Acceptance Utility Function

(ROWE)
The profile of the acceptability of the probability of occurrence for all consequences involved in a risk situation for a specific risk agent.

Risk Agent

(ROWE)
A person or group of persons who evaluates directly the consequences of a risk to which the person or group of persons is subjected.

Risk Assessment

(ROWE).
The total process of quantifying a risk and finding an acceptable level of that risk for an individual, group, or society. It involves both risk determination and risk evaluation.

Risk Assessment Methodology for Software Supportability (RAMSS)

(CURRENT)
A method of determining the disparity between the estimated risk (determined from the support concept, baseline software supportability profile, and historical maintenance profile) and the evaluated risk (determined from a conversion of the software supportability evaluation metrics).

Risk Consequence

(ROWE)
The impact to a risk agent of exposure to a risky event.

Risk Determination

(ROWE)
The process of identifying and estimating the magnitude of risk.

Risk Estimation

(ROWE)
The process of quantification of the probabilities and consequence values for an identified risk.

Risk Evaluation

(ROWE)
The complex process of developing acceptable levels of risk to individuals or society.

Risk Profile Baseline

(CURRENT)
The measure of information and/or requirements which serve as the zero reference against which negative (and positive) outcomes can be determined.

Risk Reduction

(ROWE)
The action of lowering the probability of occurrence and/or the value of a risk consequence, thereby reducing the magnitude of the risk.

Sensitivity Analysis

(ROWE)
A method used to examine the operation of a system by measuring the deviation of its nominal behavior due to perturbations in the performance of its components from their nominal values.

Simplicity

(CURRENT)
A measure of the extent that software products reflect the use of singularity concepts and fundamental structures in organization, language, and implementation techniques.

Simulation

(AFR800-14)
The representation of physical systems or phenomena by computers, models or other equipment.

Site

(CURRENT)
A software support site, or particular location, where software support activity is being accomplished. Includes sites such as the Air Logistics Centers (ALCs).

Site Survey Form

(CURRENT)
The data collection form used during the software support site visits to collect background, evaluation, and maintenance release data.

Software

(AFOTECP1)
A set of computer programs, procedures, and associated documentation concerned with the operation of a data processing system.

(CURRENT)
The programs which execute in a computer. The data input, output, and controls upon which program execution depends and the documentation which describes, in a textual medium, development and maintenance of the program.

Software Change Request

(CURRENT)
An official request that could involve a change to a software system. Such requests include problem report, enhancement requirement, modification request, or any other form that is officially tracked by a configuration management function.

Software Configuration Management

(CURRENT)
A discipline applying technical and administrative direction and surveillance to 1) identify and document the functional and

physical characteristics of a configuration item, 2) control changes to those characteristics, and 3) record and report change processing and implementation status.

Software Delivery

(CURRENT)
That point in the software life cycle when the software support function assumes responsibility for the "next" set of configuration changes to the software (e.g., next block release). This point is logically no later than PMRT, but could be as early as IOC. This applies when a contractor or government agency assumes the software support function.

Software Error

(CURRENT)
The human decision (inadvertent or by design) which results in the inclusion of a fault in a software product.

Software Fault

(CURRENT)
The presence or absence of that part of a software product which can result in software failure.

Software Life Cycle Process

(CURRENT)
The policy, methodology, procedures, and guidelines applied in a software environment to the software development and support life cycle activities.

Software Maintainability

(AFOTECP1)
The ease with which software can be changed in order to:
(1) Correct errors
(2) Add/modify system capabilities through software changes
(3) Delete features from programs
(4) Modify software to be compatible with hardware changes.

(CURRENT)
A quality of software which reflects the effort required to perform software maintenance actions.

Software Maintenance

(CURRENT)
Those actions required for:
(1) Correction - Removal, correction of software faults
(2) Enhancement - Addition/deletion of features from the software
(3) Conversion - Modification of the software because of environment (data hardware) changes.

Software Maintenance Environment

(CURRENT)
An integration of personnel support systems and physical facilities for the purpose of maintaining software products.

Software Maintenance Measures

(CURRENT)
Measures of software maintainability and environment capabilities to support software maintenance activity.

Software Maintenance Project Management

(CURRENT)
The software life cycle process management applied during the support phase for the software to accomplish specific software maintenance tasks which derive from software problem reports or change requests.

Software Management

(CURRENT)
The policy, methodology, procedures, and guidelines applied in a software environment to the software development/maintenance activities. Also, those personnel with software management responsibilities.

Software Project Management

(CURRENT)
See Software Management.

Software Project Management Design Methods

(CURRENT)
The software project management process utilizes design methods which enhance software supportability to the extent that design methodology standards and conventions are: 1) documented, followed, and validated through quality assurance, 2) can be transitioned to support activity, and 3) produce adequate design specifications which reflect supportability characteristics.

Software Project Management Implementation Methods

(CURRENT)
The software project management process utilizes implementation methods which enhance software supportability to the extent that implementation/coding/testing methodology, standards, and conventions are: 1) documented, followed, and validated through quality assurance, 2) can be transitioned to the support activity, and 3) produce supportable production products.

Software Project Management Organization Structure

(CURRENT)
The software project management process organization structure enhances software supportability to the extent that the physical structure, functional responsibilities, external interfaces and assigned personnel provide for continuity over the software life cycle phases, and have proper interfaces with organizations responsible for software support.

Software Project Management Planning

(CURRENT)
The software project management process utilizes planning which enhances software supportability to the extent that plans for the development, test, product transfer, operation and support exist, have been implemented, have been appropriately coordinated across activities, and satisfy contractual and/or regulation requirements.

Software Project Management Project Interfaces

(CURRENT)
The software project management possesses organization interfaces which enhance software supportability to the extent that external project organization relationships and responsibilities are: 1) defined, 2) provide a valuable functional role, and 3) contribute to systematic cost effective procurement, development, operation and support processes.

Software Project Management Test Strategies

(CURRENT)
The software project management process utilizes test strategies which enhance software supportability to the extent that the test plans, descriptions, procedures, and results have been: 1) documented, 2) can be transitioned to the support activity, and 3) provide for a consistent and systematic process for verifying and validating that software requirements have been satisfied.

Software Reliability

(CURRENT)
A quality of software which reflects the probability of failure free operation of a software component or system in a specified environment for a specified item.

Software Portability

(CURRENT)
A quality of software which reflects the effort required to transfer the software from one environment (hardware and system software) to another.

Software Support Concept

(CURRENT)
The estimated support personnel resources, level of dedication and expertise of the support personnel, and the duration of the block release cycle.

Software Support Facility (SSF)

(AFOTECP5)
The facility which houses and provides services for the support systems and personnel required to maintain the software for a specific ECS.

Software Support Personnel

(CURRENT)
See Support Personnel.

Software Support Resources

(CURRENT)
The totality of personnel, systems, physical facilities, and calendar time that are used/consumed during a software support release effort.

Software Supportability

(CURRENT)
A measure of the adequacy of personnel, resources, and procedures to facilitate:
(1) Modifying and installing software
(2) Establishing an operational software baseline
(3) Meeting user requirements.

Software Supportability Evaluation

(CURRENT)
An evaluation to derive a measure of how well a software system can be supported. (See Software Supportability.)

Software Supportability Evaluation Metrics

(CURRENT)
The closed-form questionnaire scores for each software supportability characteristic in a software supportability evaluation as well as the values computed by cumulating lower level scores.

Software Supportability Magnitude of Risk Consequence

(CURRENT)
The level of impact to a software user or supporter as a result of the risk level of a software supportability negative outcome.

Software Supportability Negative Outcome

(CURRENT)
Any outcome for which the software support resources are not adequate to accomplish required software support.

Software Supportability Risk

(CURRENT)
The probability at a given point during the software support phase that the software maintenance activity specified by a baseline software supportability profile cannot be accomplished with the available software support resources.

Estimated Software Supportability Risk: An estimate of the software supportability risk determined by the area under a normal distribution curve. The area is the part under the curve greater than the subject software's available person-months per change value as computed from the software support concept and baseline software change profile. The normal distribution curve is determined by using the estimated person months per change as the mean and the standard deviation from the derivation of the estimated person months per change regression equation.

Acceptable Software Supportability Risk: The estimated software supportability risk which is agreed upon by the user (using command) and supporter (supporting command) as a result of the baseline software supportability agreement.

Evaluated Software Supportability Risk: An approximation to the software supportability risk computed from the software supportability evaluation metrics. The computation is derived from a

linear regression model using the software life cycle process, software product, support personnel, support systems, and support facility as the five regression equation factors.

Measured Software Supportability Risk: See Evaluated Software Supportability Risk.

Software System

(CURRENT)
A set of software (specifications, programs, and data) which constitutes a well-defined major function or group of functions.

Typical systems include avionics OFP, ground based communications, missile guidance, simulation, threat generator, ATE, and electronic warfare.

Software System Type

(CURRENT)
One of seven classifications of a software system's primary functional mission: ATD, ATE, C-E, EW, OFP, SIM, SUP.

ATD: Aircrew Training Device or Operational Flight Trainer for training and support of an operational system, usually in the form of a mockup simulator.

ATE: Automatic Test Equipment software to support the testing of hardware units under test (UUT), create and maintain the environment where the test software may be used, or prepare/analyze/maintain test software.

C-E: Communications-Electronics software for command and control, communications, surveillance and warning, air traffic control, intelligence, and other related functions.

EW: Electronic Warfare software that involves the use of electromagnetic energy and performs functions either separate or integral to a larger airborne or ground system.

OFP: Operational Flight Program software/firmware that is integral to an onboard aircraft computer system including navigation, flight control, fire control, weapon delivery, electronic engine control, and heads-up display.

SIM: Simulation Software not included as part of the ATD, including simulation models.

SUP: Support Software including application support software and system support software not included in any other category.

Specification Change Notice (SCN)

(CURRENT)
The SCN is used to distribute approved page changes to authorized users of baseline documents who, in turn, are responsible for posting the updates.

Source Code

(CURRENT)
The form of the program code in its source language.

Standards

AFOTECP3)
Procedures, rules, and conventions used for prescribing disciplined program design and implementation.

Support Concept

(CURRENT)
The software support concept usually specified as part of the CRISP and OS/CMP. Also includes that part of the support concept necessary to establish the acceptable risk from a baseline software change profile: standard release duration, number of support personnel, average skill level, percentage of personnel dedicated to releases, support facility, etc.

Support Facility

(CURRENT)
The physical facility resources that must be available for the software support resources to accomplish a specific task(s).

Support Personnel

(CURRENT)
A general term for personnel (military, DoD civilian, or DoD contractor) whose skills are necessary to directly support mission critical system software maintenance. Includes but is not limited to management, technical, non-technical support, and contractor personnel.

Support System

(AFOTECP5)
Any automated system used to change, test, or manage the configuration of ECS software and associated documentation. Includes but is not limited to Host Processor, Software Bench, Laboratory-Integrated Test Facility, Operational-Integrated Test Facility, and Configuration Management System.

Support System Facility

(AFOTECP5)
The facility resources that must be available for the software support resources to accomplish a specific task(s).

System Software

(AFOTECP5)
All of the software that is part of the software support facility computer system. It is never or seldom accessed directly by software support facility personnel; it controls the processing of application software. It includes the Operating System, Source Code Editor, Language Translator, Link Editor/Loader, Librarian/File Manager, Data Base Manager, and Automated Software Development Tool.

Test and Evaluation Master Plan (TEMP)

(AFR55-43)
An overall Test and Evaluation (T&E) plan designed to identify and integrate the effort and schedules of all T&E to be done in an acquisition program.

Threshold

(ROWE)
A discontinuous change of state of a parameter as its measure increases. One condition exists below the discontinuity, and a different one above it.

Time to Complete Maintenance Request (TC)

(CURRENT)
The calendar time from receipt of the maintenance request by the support control group until the request has been accepted as part of an operational system software configured release. (This does not mean the configuration is released or distributed, and this time does not include this additional delay, if any.)

Type

(CURRENT)
See Maintenance Type.

Uncertainty

(ROWE)
The absence of information; that which is unknown.

Urgent MA

(CURRENT)
See Maintenance Priority.

Verification/Validation (of computer programs)

(AFR800-14)
The process of determining that the computer program was developed in accordance with the stated specification and satisfactorily performs, in the mission environment, the function(s) for which it was designed.